

## 12 SAFE WORK REQUIREMENTS

### 12.1 ABRASIVE WHEELS

#### 12.1.1 PURPOSE

The requirements stated within this work practice are established to prevent injury to employees who are required to work with various forms of abrasive wheels and associated equipment.

#### 12.1.2 SCOPE

These work practices apply to any DMB employee with a job that consists of working with or around abrasive wheels. It is the supervisor's responsibility to ensure that the information and work practices contained herein are effectively communicated and followed.

#### 12.1.3 DEFINITIONS

Abrasive Wheel (Wheel) means a cutting tool that consists of abrasive grains held together by a bonding material.

Blotter means a flat disc of compressible material that cushions the area of a grinding wheel coming in contact with a flange.

Concrete Sawing means the cutting or slotting of materials such as concrete or asphalt where the sawing machine rides upon the surface being sawed.

Flange means a collar, disc, or plate between which abrasive wheels are mounted.

Guard means an enclosure that is designed to restrain pieces of abrasive wheel and protect the employee if the wheel breaks.

Mounted Wheels means various shaped abrasive wheels not more than 2 inches in diameter and mounted on plain steel mandrel.

Portable Grinding means a grinding operation where the machine is designed to be hand held and may be easily moved from one location to another.

Revolutions Per Minute (RPM) means the number of complete turns that a grinding wheel makes in one minute.

#### 12.1.4 RESPONSIBILITIES

##### 12.1.4.1 *Management*

- Instruct employees in the safe operation of grinders prior to use.

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- Train employees on how to inspect, mount, and maintain abrasive wheels.
- Ensure abrasive wheels are handled and stored properly.
- Maintain equipment (ensure machine is operated with specific guards).
- Monitor the use and application of abrasive wheels and associated equipment.
- Maintain equipment in a condition, which will not create a hazard for employees.

### 12.1.4.2 **Employee**

- Understand the requirements for the safe care, use, and protection of abrasive wheels and associated equipment.
- Inspect abrasive wheels for damage or breakage, before mounting.
- Test abrasive wheel (ring test, tapped by a nonmetallic tool such as the handle of a screw driver).
- Report any defects of abrasive wheels or grinder machine to supervisor.

### 12.1.5 **REQUIREMENTS**

1. Grinder guards and fasteners must be constructed to be capable of retaining pieces of a broken wheel.
2. Enclosures or barriers shall be provided to isolate the operator in the work area and protect other employees from flying fragments or particles.
3. Portable grinders must be equipped with a guard that is between the operator and the abrasive wheel.
4. Revolving guards must not be used.
5. The maximum opening of the tongue guard for an abrasive wheel on a bench, floor, or cylindrical grinder cannot exceed  $\frac{1}{4}$  inch.
6. Work rest for off hand grinders shall be adjusted and maintained to within  $\frac{1}{8}$  inch of the abrasive wheel to prevent the work piece from jamming between the abrasive wheel and the wheel guard.
7. Bushings used in mounting an abrasive wheel cannot be greater the width of the wheel or make contact with the flange.
8. When blotters are used between a flange and the abrasive wheel, they must cover the entire contact area of the flange. *For exceptions see: MIOSHA, General Industry Part 1A "Abrasive Wheels".*

9. The operation of grinding equipment must follow the manufacturers recommended guidelines and the designed speed (RPM) marked on the equipment. All equipment must be maintained and inspected, to prevent wheel over-speed.
10. The supervisor must monitor any speed adjustments.

#### **12.1.6 TRAINING**

Employees need to be instructed in the care, use, operation and hazards associated with abrasive wheels and related equipment before being assigned a job task by the employer. Training should consist of information contained within this work practice requirement and other information related to the type of equipment and its use within a specific work assignment. Instruction can be on-the-job or classroom or a combination of both. The supervisor must retain training documentation.

#### **12.1.7 REFERENCES**

*For additional information regarding guarding and component specifications, refer to tables in MIOSHA, General Industry Safety Standards, Part 1A “Abrasive Wheels”*

*For additional information regarding mounting provisions refer to MIOSHA, Occupational Health Standards for General Industry, Rules 408.10151-10159*

## **12.2 ACCIDENT PREVENTION SIGNS AND TAGS**

### **12.2.1 PURPOSE**

The requirements stated in this work practice provide specifications for the design, application and the use of signs, symbols, or tags to signal or define a specific hazard in or around DMB, where failure to designate a hazard could result in an injury to an employee.

### **12.2.2 SCOPE**

These requirements apply to all state facilities, to inform employees of hazards. Accident prevention sign and tag standard colors are (red) DANGER, (yellow) CAUTION, and (green) SAFETY. Exempt to this requirement is safety instructional, directional, and in-plant traffic signs in use before December 13, 1974.

### **12.2.3 DEFINITIONS**

Accident prevention sign means the surface on which letters or markings are used to warn of a hazard, provide safety instructions or provide directions. An accident prevention sign may be temporarily or permanently affixed or placed.

Accident prevention tag means the surface on which letters or markings are used to warn of an existing or immediate hazard and which is temporarily attached to a part of equipment or structure.

"Caution" sign or tag means a sign or tag used to warn of a potential hazard or to warn against an unsafe practice.

"Danger" sign or tag means a sign or tag used to signal an immediate hazard.

"Do not start" sign or tag means a sign or tag used to tag out the starting mechanism of equipment that would cause a hazardous condition if activated.

"Exit" sign means a sign used to designate a point of discharge for a room or building.

"Out of order" sign or tag means a sign or tag used only for the specific purpose of indicating that equipment or machinery is out of order and its use might create a hazard.

Safety instruction sign means a sign used for general instruction or suggestion relative to safety.

### **12.2.4 RESPONSIBILITIES**

#### **12.2.4.1 Management**

- Establish and maintain an accident prevention sign and tag system.

- Provide warning of hazards; provide safety instruction or direction during hazardous situations.
- Install and maintain signs and tags where an employee might be or likely be injured if not informed or alerted to a specific hazard.

#### **12.2.4.2 Employee**

- Follow information or safety instructions as defined on signs or tags.
- Never remove, obstruct, or transfigure an accident prevention sign or tag.

### **12.2.5 REQUIREMENTS**

1. A sign must be constructed with rounded or blunt corners and must be free of sharp edges, burrs, splinters, or other sharp projections.
2. The signs fastening devices must not create a further hazard (cut or puncture).
3. Lettering must be block style, upper case for the upper panel, and upper or upper and lower case for the bottom panel.
4. The lettering size is determined by viewing distance (visibility, readability), and / or the length of the message.
5. The sign must be placed to alert and inform in time to avoid the hazard or take appropriate action.
6. The sign must be legible and without a distraction, that will create a further hazard in itself.
7. If on or adjacent to a movable object, the sign must be so placed that it will not be obscured when the object is moved.
8. The sign must be illuminated with at least 2-foot candle intensity at the time the employee is present.

#### **12.2.5.1 Sign Classification**

##### **12.2.5.1.1 Danger Signs**

1. Key color (red).
2. A danger sign must be used only where an immediate hazard exists.
3. When the hazard is removed the sign must be removed.
4. An employee must be informed or instructed by the danger sign and that it indicates an immediate danger and special precautions are necessary.

**12.2.5.1.2 Caution Sign**

1. Key color (yellow).
2. A caution sign must warn an employee that a potential hazard exist and to caution against an unsafe practice.
3. An employee must be instructed on the meaning of the caution sign (indicating a possible hazard), and the proper precautionary measures must be taken.

**12.2.5.1.3 Safety Instruction Sign**

1. Key color (green).
2. A safety instruction sign must be used to instruct or suggest to employees relative safety measures.
3. Directional signs.
4. Directional signs are put in place to provide safety instruction to employees relating to directions.
5. Directional arrows are used as the instruction signal.

**12.2.5.1.4 Tags**

1. Accident prevention tags are used as a temporary means of warning an employee of an existing hazard, such as defective tools or equipment.
2. Tags can be attached using a string, wire, or adhesive.
3. Tags must be large enough to attract attention to the hazard.
4. The tag must be protected to maintain legibility, until hazard is removed.
5. Types of tags include ("Do not start", "Danger", "Caution", and "Out of order" tags).

**12.2.6 TRAINING**

Employees need to be instructed in the purpose, importance, and any specific procedures to be taken when relating to designated signs and tags of hazards. Training should consist of information contained within this work practice requirement and other information related to the type of hazards that may be encountered through specific work assignment. Instruction can be on-the-job,

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classroom, or a combination of both. The supervisor must retain training documentation.

**12.2.7 REFERENCES**

*For additional information regarding signs and tags, such as specific sign colors and formats, letter height, and emblems for slow moving vehicle, refer to MIOSHA, General Industry Safety Standard Part 37 "Accident Prevention Signs & Tags".*

*For additional information regarding exit signs refer to MIOSHA, General Industry Safety Standard Part 6 "Fire Exits".*

## **12.3 AUTOMOBILE PAINTING**

### **12.3.1 PURPOSE**

The requirements of this work practice outline the safety precautions required to control employee exposure to hazardous vapors, and provide for the safe dispensing and disposal of flammable liquids.

### **12.3.2 SCOPE**

The following requirements apply to the application of surface coatings to the exterior of automobiles and mobile equipment. Only knowledgeable and trained employees are to apply surface coatings to automobiles and other mobile equipment.

### **12.3.3 DEFINITIONS**

Approved means, unless otherwise indicated, approval or listing by Underwriters Laboratories, Inc. or Factory Mutual Engineering Corporation, or both.

Combustible Liquid means any liquid having a flash point at or above 100 degrees Fahrenheit (37.8 degrees Celsius) closed cup.

Flammable Liquid means any liquid having a flash point below 100 degrees Fahrenheit (37.8 degrees Celsius) closed cup and have a vapor pressure not exceeding 40 psi absolute (2068.6 mm) at 100 degrees Fahrenheit (37.8 degrees Celsius).

Liquids Within the Scope of this Standard means combustible liquid or flammable liquid.

Spray Area means any area in which dangerous quantities of flammable or combustible vapors, mists, residues, dusts, or deposits are present due to the operation of the spray processes.

Spray Booth means a power-ventilated structure provided to enclose or accommodate a spraying operation to confine and limit the escape of spray, vapor, and residue, and to safely conduct or direct them to an exhaust system.

Spray Finishing Operations means the employment of methods wherein organic or inorganic materials are utilized in dispersed form for deposit on surfaces to be coated, treated, or cleaned. Such methods of deposit may involve either automatic, manual, or electrostatic deposition, but do not include metal spraying or metalizing, dipping, flow coating, roller coating, tumbling, centrifuging, or spray washing and degreasing as conducted in self-contained washing and degreasing machines or systems.

Spray Room means a room in which spray finishing operations, which are not conducted in a spray booth, are performed separately from other areas.

Vapor Area means any area containing flammable vapor concentrations exceeding 25% of the lower explosive limit (LEL) in the vicinity of dipping and coating



processes, drain-boards or associated drying, conveying, or other equipment, during operation or shutdown periods.

## **12.3.4 RESPONSIBILITIES**

### **12.3.4.1 Management**

- Instruct employees on the safe handling and storage of paint.
- Train employees on the proper use and handling of respirators where applicable.
- Assure proper ventilation is available where needed.
- Train employees on proper fire fighting equipment provided.
- Train employees on fire protection activities such as proper bonding and grounding of flammable materials.
- Train employees on hazardous contaminants associated with painting operations.

### **12.3.4.2 Employee**

- Understand the requirements relating to safe operation of painting facilities, handling and storage.
- Understand proper use of respiratory equipment and other personal protective equipment when needed.
- Understand bonding and grounding of flammable materials.
- Practice good hygiene when handling hazardous materials.

## **12.3.5 REQUIREMENTS**

### **12.3.5.1 Health Hazards**

In spray painting operations, paints and solvents are atomized into a mist, which can be inhaled by the employee. Vapors can also be released in paint drying process as well as the collection and disposal of over-spray coated filter media.

The following precautions should be taken to protect employee health:

1. All spray painting should be performed in a standard automobile spray painting room or booth.

2. This spray painting room should be equipped with ventilation capable of removing the solvents and paint overspread from the operator's area.
3. The employee should be required to wear respiratory protection. Wearing a nuisance dust mask gives no protection from solvent vapors. Employees should wear a double cartridge respirator or fresh air supply respirator for vapors and mists.
4. If an employee is required to wear respirators, they should be fully trained, and the training should be documented. *See Section 11.7 Respiratory Protection.*
5. Spray painting and priming must be performed in a mechanically ventilated spray booth.

#### **12.3.5.2    *Spray Painting***

Painting operations will only be conducted where there is adequate ventilation, where flammable finishes can be safely dispensed, stored and disposed of, and personal protective equipment is available.

#### **12.3.5.3    *Fire Protection***

1. Spray operations should be isolated from other areas by the following controls:
  - a. Spray painting in a ventilated, fire resistant room.
  - b. Confining spray painting to standard spray booths.
2. Ignition sources should be controlled in the spray area.
  - a. All electrical wiring and fixtures within 10 feet of spray operators should be rated for Class I Hazardous Locations (including portable lamps, heaters, etc.)
  - b. Any welding, grinding, etc. should be done in a separate room.
  - c. The exhaust fan motor should be located outside the duct.
  - d. Post the hazardous area with "No Smoking" and "Flammable Liquid" signs.
3. All flammable vapors must be removed during the painting operations.
  - a. A ventilation system with mechanical exhaust must be provided.
  - b. Filters should be changed and ducts cleaned regularly.
4. Fire Protection must be provided to limit any fires.
  - a. An automatic fire suppression system is required in the booth and ventilation duct.
  - b. Any sprinkler heads or discharge heads should be protected from paint overspray.
  - c. Portable dry chemical fire extinguishers should be provided within 30 feet.
  - d. A fire blanket must be in the paint mix room.
5. Housekeeping in the spray painting area must be controlled.

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- a. Booth surfaces must be cleaned.
- b. All combustible or flammable materials should be removed from areas where spraying operations are in close proximity.
- c. All used filters should be immediately disposed of in an area at a safe distance outside the building.
- d. Paint mixing areas should be in good order and spills immediately cleaned.
- e. All soiled rags, clothing, etc. should be disposed of in a U.L. listed safety can.

### **12.3.6 TRAINING**

Employees need to be instructed in the care, use, operation and hazards associated with painting operations before being assigned a job task by the employer. Training should consist of information contained within this work practice requirement and other information related to the type of equipment and its use within a specific work assignment. Instruction can be on-the-job or classroom assignment or a combination of both. The supervisor must retain training documentation.

### **12.3.7 REFERENCES**

*For additional information regarding spray finishing operations, refer to MIOSHA, General Industry Safety Standard Part 76 "Spray Finishing and Dip Tanks".*

## **12.4 AUTOMOTIVE SERVICE OPERATIONS**

### **12.4.1 PURPOSE**

The requirements stated within this work practice are established to prevent injury to employees who perform activities relating to automotive/truck servicing.

### **12.4.2 SCOPE**

These work practices apply to any Vehicle Transportation Service employee with a job that consists of vehicle and or tire and wheel assemblies' service, repair and salvage. It is the supervisor's responsibility to ensure that the information and work practices contained herein are effectively communicated and followed.

### **12.4.3 DEFINITIONS**

Automotive Lift means a vehicle-lifting device, the purpose of which is to raise an entire vehicle to provide accessibility for convenient under-chassis service.

Extractor means a machine, except a vacuum cleaner, used to remove moisture from fabrics.

Jack means a portable mechanical or hydraulic device for lifting or lowering a load by application of a force.

Lockout means to lock by key or padlock.

Pinch Point means a point at which it is possible to be caught between the moving parts of a machine, between the moving and stationary parts of a machine, or between a moving object and a stationary object.

Restraining Device means a mechanical apparatus, such as a safety cage, rack, or safety bar arrangement or other machinery or equipment, that will constrain all rim wheel components following their release during an explosive separation of the wheel components.

Rim Manual means a publication containing instructions from the manufacturer or other qualified organizations for the correct mounting and demounting, maintenance, and safety precautions peculiar to the type of wheel being serviced.

Service means to adjust, install, repair, replace, wash, wax, change, or exchange, polish, sand, grind, refinish, paint, or coat.

Single-Piece Rim Wheel means a vehicle wheel or rim which consist of one part, which is designed to hold the tire on the rim when the tire is inflated, and which is intended for the use with tires designed for an inflation pressure of more than 44 psig.

Vehicle means a powered conveyance operating on two or more wheels, including, but not limited to, an automobile, truck or trailer.

## **12.4.4 RESPONSIBILITIES**

### **12.4.4.1 *Management***

- Provide training for the hazards, safe equipment operation and applicable rules of this section.
- Ensure that job required tools, equipment and the work area are maintained in a manner free of recognized hazards which would cause an injury.
- Prohibit smoking, flames and sparks within 15 feet of where flammable and combustible liquids are dispensed or used, unless separated by an approved wall. "No Smoking" signs must be posted in these restricted areas.
- Maintain a copy of the MIOSHA, General Industry, Part 72 Automotive Service Operations for employees to review.
- Prohibit the removing or disabling of any safeguard unless required during equipment service. The safeguard must be replaced before resuming operation of the equipment.

### **12.4.4.2 *Employee***

- Use personal protective equipment required by this section.
- Use tools and equipment only when authorized or trained.
- Report any defective or damaged tools or equipment to supervisor.
- Maintain all personal tools, equipment and work areas in a manner to prevent a hazardous condition.
- Do not smoke, create a spark or flame within 15 feet of an exposed flammable liquid or articles.
- Never bypass or disable any safeguard, or tie down any controls, unless required, during servicing. The safeguard must be replaced before resuming operation of the equipment.
- Never use a compressed air line for cleaning clothes or skin.
- Use tools and equipment within their rated capacity.

## **12.4.5 REQUIREMENTS**

### **12.4.5.1 *Housekeeping***

1. Oily rags or wiping cloths soiled from oil, grease, paints or solvents, must be placed in their own covered metal container, which must be labeled or identified as combustible material.
2. Rubbish must be placed in metal containers.
3. Floors must be maintained free of water, oil, and grease that could cause a hazard of slipping, tripping or falling.
4. After a vehicle is serviced, tools, loose parts, materials and general debris must be cleaned up.

### **12.4.5.2 *Personal Protective Equipment***

1. All personnel must wear eye protection when in the service area.
2. Other PPE such as, but not limited to, rubber gloves, aprons, boots, welding helmets and respirators must be provided and worn by the employee to protect against the hazards of wet operations, welding and cutting, radiator cleaning and battery charging and spray painting.
3. Wear respiratory protective equipment and hearing protection when required.
4. Where corrosive liquid or other liquid materials that would be harmful to an employee are normally used and where an employee is exposed to splash of the materials, an easily accessible means of flushing with water must be provided.
5. Cloth shoes, open sandals and exposed rings and necklaces must not be worn in the service area. A ring may be worn if covered by gloves or tape.

### **12.4.5.3 *Illumination***

When automotive/truck servicing is being performed, a minimum of 25-foot candle intensity of lighting must be provided.

### **12.4.5.4 *Machinery and Equipment Installations***

1. Electrically powered machinery or equipment (other than double insulated) must be grounded.
2. Non-portable machinery or equipment must be secured to the floor, platform, table or bench to prevent displacement or tipping.

3. Machinery or equipment must be equipped with a disconnect locked in the off position during repair or servicing if unexpected motion would cause injury.
4. Electrical equipment used within a spray booth containing flammable materials must be suited for a Class 1, Division 1 hazards.
5. A foot control used on machinery must be provided with a cover or guard to prevent unintentional operation. The cover or guard must be capable of withstanding a static load of 200 pounds without permanent deformation, and constructed in a way not to cause discomfort or injury to the employee.

#### **12.4.5.5 Ventilation and Air Receivers**

1. Ventilation must be provided and used to exhaust toxic vapors or fumes if such vapors or fumes exceed the maximum allowable limits.
2. The blades of a fan less than 7 feet from the floor, platform or ground must be guarded on all sides. Openings in the guard can not be more than 1 inch and the distances must not be more than the values specified on *table 1 of MIOSHA General Industry, Part 72 Automotive Service Operations*.
3. A fan must not be located where the fumes of flammable liquids can be induced into an area where sparks or flame may be present.
4. An air receiver must be equipped with an operable relief valve set at not more than the working load limit of the receiver.

#### **12.4.5.6 Flammables, Painting and Coating**

1. Class 1 flammable solvents stored inside a building must be in an approved safety container with an automatic closing cap and flame arrester or original unopened container having a capacity of not more than 5 gallons. Quantities in excess of 5 gallons must be stored as prescribed by flammable liquid regulations of the fire marshal promulgated under *Michigan Fire Prevention Code, Act 207 of the Public Acts of 1941, as amended*.
2. When pouring a flammable solvent from one container to another, continuous contact between the containers must be maintained or a bonding or grounding strap shall connect the containers.
3. Class 1 flammable solvents must not be used for cleaning tools parts, floors or booths.
4. Paint spraying with a flammable ingredient to an area of more than 9 square feet must be made within a booth or room constructed of noncombustible material. The booth or room must be ventilated; sparks, flame producing equipment and smoking are prohibited within this area. The area must be posted "No Smoking".

5. When flammable liquid is removed from a vehicle tank, an approved pumping device equipped with a ground strap must be used.

#### **12.4.5.7 Belt Servicing**

An employee adjusting or testing the tension of a belt, or installing or removing a belt on a vehicle must do so when the motor is off and without turning the engine over.

#### **12.4.5.8 Air Conditioning and Refrigeration Servicing**

A check valve must be used to prevent refrigeration system pressures from flowing back to the refrigerant-charging container unless such containers are equipped with a pressure relief valve.

#### **12.4.5.9 Cranes and Winches, Hoists And Chain Falls**

1. A crane, hoist, chain fall or winch, fixed or portable, must have affixed to it a permanent tag showing the rated capacity and name of manufacturer and if available, the model and serial numbers.
2. A crane, hoist, chain fall or winch must not be used to lift more than its rated capacity.
3. Wire rope or cable used in a crane, hoist or winch must be inspected monthly, and shall be replaced if:
  - a. In any length of 8 diameters, the total number of visible broken wires exceeds 10% of the total number of wires.
  - b. The wire rope or cable has been kinked; crush or bird caged or sustained other damage, which distorts the wire rope structure.
  - c. The wire rope or cable shows heat or corrosive damage.

#### **12.4.5.10 Wreckers**

1. A wrecker cable and boom must have a designed safety factor of not less than 5.

If the wire rope on a cable drum needs to be replaced, it is recommended that the manufacturer be contacted to determine suitable replacement specifications (load capacity). If the manufacturer cannot be identified and cables need replacement, determine the heaviest load to be applied and multiply this load by a 5 to achieve the appropriate safety factor.

2. Wire rope or cable used on a wrecker must be inspected under the same specifications as cranes, hoists, winches and chain falls.
3. A wrecker pulling or lifting a vehicle shall be used within its rated capacity.



4. When towing a vehicle with a wrecker cable, the employee shall stand aside from the line of pull.
5. When towing a boom supported vehicle, safety chains must be connected between the wrecker and the towed vehicle.
6. A wrecker boom must be equipped with a permanent tag showing the rated capacity and the name of the manufacturer, as well as model and serial numbers.
7. The winch controls must be located in a manner to prevent accidental contact with cable and winch pinch points or the pinch point shall be guarded.

#### **12.4.5.11 *Jacking and Blocking***

1. A vehicle being serviced, adjusted or repaired while the motor is running must have two wheels chocked from front and rear, or parking brake set, or other vehicle restraint controls provided.
2. An employee shall not place their body underneath a vehicle supported only by a jack, overhead hoist or chain fall. Safety strands having a yield point of not less than 1-1/2 times its rated capacity must be used to support the vehicle.
3. A jack must not be used to lift more than its rated capacity.

#### **12.4.5.12 *Rim and Wheel Servicing***

1. An employer must ensure that each employee who is engaged in servicing multi-piece and single-piece rim wheels demonstrates and maintains his or her ability to service the rims safely and in accordance with these rules.
2. All wheel components must be inspected before assembly. Rims, rim bases, side rings, or lock rings that are bent out of shape, pitted from corrosion, broken, or cracked must not be used, welded or brazed, or otherwise heated in attempt to repair them. The defective component must be rendered unusable for the tire mounting.
3. Tires must be completely deflated by removal of the valve core before demounting and disassembly of the components.
4. A restraining device, described as a mechanical apparatus, such as a safety cage, rack or safety bar arrangement, or other equipment that will constrain all rim wheel components following their release during an explosive separation of wheel components must be provided by the employer and maintained in a safe condition, and in compliance with all the following requirements:
  - a. Each restraining device or barrier must have the capacity to withstand the maximum force that would be transferred to it during a rim wheel

- separation that occurs at 150% of the maximum tire specification pressure for the type of rim being serviced.
- b. Restraining devices and barriers must be capable of preventing the rim wheel component from being thrown outside or beyond the device or barrier for any rim wheel that is positioned within or behind the device.
  - c. Restraining devices and barriers must be visually inspected before each day's use and after any separation of the rim wheel components or sudden release of contained air. A restraining device or barrier that exhibits evidence of damage, such as any of the following defects, shall be immediately removed from service:
    - 1) Cracks at welds
    - 2) Cracked or broken components
    - 3) Bent or sprung components caused by mishandling, abuse, tire explosion, or rim wheel separations
    - 4) Pitting of components due to corrosion
    - 5) Other structural damage that would decrease the effectiveness of the restraining device or barrier
  - d. A restraining device or barrier that is removed from service must not be returned to service until it is repaired and reinspected. A restraining device or barrier that requires structural repair, such as component replacement or rewelding, must not be returned to service until it is certified by either the manufacturer or a registered professional engineer that the device or barrier meets the strength requirements specified in *Section 12.4.5.12. (4.a)*.
5. A clip-on chuck with sufficient length of hose to permit the employee to stand clear of the potential trajectory of the wheel components and an in-line valve with gauge or a pressure regulator preset to the desired pressure must be furnished by the employer and used to inflate tires.
  6. Industry accepted tire lubricant must be applied to the bead and the rim-mating surface during assembly of the tire and wheel.
  7. When a tire is in a restraining device, an employee must not rest or lean any part of his or her body or equipment on or against the devices.
  8. An employee must not try to fix the seating of the wheel component, rim, rim base, or side and lock rings by hammering, striking, or forcing the components while the tire is pressurized.
  9. Heat must not be applied to an inflated wheel tire assembly.

#### **12.4.5.12.1 Multi-Piece Rim Wheels**

1. Wheel components must not be interchanged except as permitted pursuant to the publication *"Multi-piece Rim/Wheel Matching Chart"*, available from the Safety Standards Division, Michigan Department of Consumer and Industry Services.

2. Mating surfaces of the rim gutter ring must be free of any dirt, surface rust, scale, or rubber build-up before mounting and inflation.
3. A tire must be completely deflated by removal of the valve core before a wheel is removed from the axle in either of the following situations:
  - a. When the tire has been driven under-inflated, at 80% or less of its recommended pressure.
  - b. When there is obvious or suspected damage to the tire or wheel components.
  - c. Tires shall be inflated only when constrained by a restraining device, except when the wheel assembly is on a vehicle. Tires may be inflated without being constrained by a restraining device if remote control equipment is used and no employees remain in the trajectory path during inflation in either of the following situation:
    - 1) Tires are under-inflated, but have more than 80% of the recommended pressure.
    - 2) Tires are known not to have been run under-inflated.
4. When a tire is being partially inflated without a restraining device for the purposes of seating the lock ring or to round out the tube, such inflation must not exceed 3 psi.
5. After tire inflation, the tire rim and rings must be inspected while still constrained in the restraining device to assure they are properly seated and locked.

#### **12.4.5.12.2 Single- Piece Rim Wheels**

The rules below apply to the servicing of single-piece wheel rims used on vehicles such as trucks, trailers, buses, and off-road machines, which have a tire inflation that is 45 psig or greater. The rules don't apply to single-piece rim wheels used on automobiles and light-duty trucks or vans utilizing automobile tires.

1. A rim manual, describing safety precautions and service instructions of single-piece rims must be made available in the service area.
2. The size and type of both the tire and the wheel must be checked for compatibility before assembly of the rim and wheel.
3. Mounting and de-mounting of the tire must be done only from the narrow ledge side of the wheel. Care must be taken to avoid damaging the tire beads while mounting tires on wheels.
4. If a bead expander is used to seat the beads, it must be removed before a tire is inflated to more than 10 psi.
5. To seat the bead while the rim wheel is restrained on a tire changing machine, the tire must not be inflated to more than the operating

pressure indicated on the tire or the posted capacity on the machine, whichever is the lesser. If, during inflation, the tire beads do not progress toward the flanges in a normal manner or are not fully seated by the same time the tire is inflated to its designated pressure, the tire must be deflated and the rim wheel disassembled. The wheel and tire must be rechecked for compatibility, relubricated, repositioned, and then reinflated in accordance with this rule.

6. A tire inflated in accordance with rule 5, which reaches the tire changing machine's posted capacity before becoming inflated in excess of its operating pressure to fully seat must be bolted on the vehicle, with lug nuts fully tightened.
7. Employees must stay out of the potential trajectory of the wheel when inflating a tire and must not lean or place a rim wheel on or against any flat solid surface.

#### **12.4.5.13 Radiators and Gas Tanks**

1. A radiator cap must not be removed until the pressure has been relieved.
2. Where radiators are repaired and cleaned by use of caustic solutions, the employee must be protected by boots, gloves, rubber apron, safety glasses and face shield. A deluge water supply at a fixed location must be available within 25 feet of the hazard source. This equipment must be posted: "Emergency Shower".
3. When the top of an open tank or vat containing a hazardous substance is less than 36 inches from the floor, platform, or ground level, a barrier must be erected to a height of not less than 36 inches on exposed sides.
4. Gasoline tanks must be thoroughly evacuated and maintained free of all explosive vapors or gasoline before commencing welding or soldering repairs.

#### **12.4.5.14 Transmission**

When removing or replacing a transmission from below a vehicle, a cradle type device must be used to hold and carry the transmission.

#### **12.4.5.15 Extractors and Wringers**

1. An extractor must be equipped with a metal cover interlocked in a manner to prevent opening when the basket is in motion and power operation of the basket when the cover is open.
2. An extractor must be equipped with a motor brake.

3. A power wringer used to remove moisture from fabrics must be equipped with a safety release bar, which must remove the tension of the wringer rolls when struck.

#### **12.4.5.15.1 Car Wash Conveyors**

1. A conveyance used to move a vehicle along a line of working equipment or moving such equipment along a vehicle shall have the conveyor, track or chain outlined by a four inch strip of yellow zone paint or other warning means located within eight inches of the hazardous area.
2. Pinch points exposed to contact must be guarded.

#### **12.4.5.15.2 Automotive Lifts**

1. When an employee is required to work underneath a vehicle supported by a hydraulic lift, the lift must be used only when an auxiliary support device is engaged and capable of supporting the rated capacity of the lift.
2. An automotive lift purchased after December 28, 1974 must have affixed to it a permanent tag showing the name of the manufacturer, model and serial number and rated capacity.
3. An automotive lift purchased before December 28, 1974 must be equipped with a permanent tag showing the name of the manufacturer and its rated capacity. Where this information is not available, a knowledgeable outside source may determine the rated capacity. The capacity must be permanently labeled on the left side.
4. An automotive lift must not be used to lift more than its rated capacity.

#### **12.4.5.15.3 Automotive Lift Inspections**

Wire rope on a mechanical-type lift inspection are equivalent to the type of inspection prescribed to cranes, hoists, winches, and chain-falls. (See Section 12.5 Cranes and Hoists.)

The following items must be inspected and the inspections must be repeated not less than annually thereafter.

1. bolster connections
2. lifting arms and pads
3. lift control devices
4. oil reservoir level
5. cylinder packing
6. all other critical components

Defects must be repaired before the hoist is returned to service.

#### **12.4.5.15.4 Automotive Lift Specifications**

1. Fixed obstructions, protrusions, and other trip, slip, and fall hazards located in the work area of a lift, must be color coded as prescribed in *General Industry Safety Standard Part 1 Rule 18*.
2. Vehicle positioning means, such as locating ribs, positioning devices, or floor markings, must be used with frame axle engaging lifts.
3. A hydraulic automotive lift cylinder installed underground in a fixed position must be protected from possible catastrophic failure by electrolytic corrosion at the bottom of the cylinder. At least one effective means, such as one of the following corrosive protective methods, shall be used to protect the cylinder:
  - a. The cylinder bottom must be imbedded in concrete to the depth of not less than three inches and with not less than a one-inch wall thickness.
  - b. A square plate which is not less than 1/2 inch greater in diameter than the cylinder bottom and which is thicker than the cylinder wall must be continuously welded to the cylinder bottom.
  - c. The cylinder must be encased in a watertight electrical insulating housing, wrap, or coating.
4. An electromechanical power lift must have all of the following devices:
  - a. A separate deadman-type raise-lower switch mounted on the power column.
  - b. A separate power disconnects switch that is readily accessible to the operator in the lift area.
  - c. A device to automatically de-energize the lift when it has reached the limits of its travel.
5. A screw driven lift shall be provided with a safety nut to follow the main drive nut, which must be capable of sustaining the imposed load in case of failure of the main drive nut.
6. The lift control mechanism must automatically return to neutral or "off" position when released by the operator.

#### **12.4.6 TRAINING**

Employees need to be instructed in the care, use, operation, and associated hazards of assigned tasks. Additional information relating to the identity of hazards associated with specific tasks, as they relate to automotive service operations, is available in the *Risk Assessment Manual specific for Vehicle and Transportation Services*.

Training should consist of information contained within this standard and other sources of information related to the type of vehicle serviced. Instructions can be on-the-job, classroom or a combination of both. The supervisor must retain training documentation.

#### **12.4.7 REFERENCES**

*For additional information regarding construction, care and use of automotive lifts refer to ANSI Standard (American National Standards Institute), B153.1-1974.*

*For additional information regarding color-coding refer to MIOSHA, General Industry, and Part 1 Rule 18 “Color Coding”.*

*For additional information regarding fire prevention refer to the Michigan Fire Prevention Code, Act 207 of the Public Acts of 1941, as amended.*

*For additional information refer to MIOSHA, General Industry Standard Part 72 Automotive Service Operations.*

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## **12.5 CRANES AND HOISTS**

### **12.5.1 PURPOSE**

The following requirements ensure the safe operation, maintenance and use of cranes and hoists used for movement and handling. Included within these requirements are practices for the periodic inspection of controls, safety features, mechanical components and associated devices.

### **12.5.2 SCOPE**

Only trained operators will be authorized to operate, use and maintain cranes and hoists and associated slings, chains and strapping devices. The requirements stated herein must be reviewed as a component of specific task instruction in addition to the manufacturers' recommended operating and maintenance requirements.

### **12.5.3 DEFINITIONS**

Brake means a device used for retarding or stopping motion by friction or power means.

Controller means a device with a handle or push button that controls the motion of the crane.

Hooker means an employee who attaches the load to the hook in hoisting or setting the load or both.

Load means the total superimposed weight on a load block or hook.

Main switch means a switch on a crane controlling the entire power supply to the crane except that a magnet and convenience outlet circuit may bypass the main switch.

Overhead crane means the top running crane with movable bridge carrying a movable or fixed hoisting mechanism for lifting and lowering, horizontally and traveling on an overhead fixed runway.

### **12.5.4 RESPONSIBILITIES**

#### **12.5.4.1 Management**

- Train operator on the safe use and operation of the specific types of cranes and hoists employee will operate before job assignment. Document Training.
- Test the knowledge and the abilities of the employee before authorizing them to operate crane or hoist.
- Limit use of crane or hoist to only authorized and qualified employees.

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- Limit the use of the crane or hoist to its maximum rated capacity.
- Establish a lockout procedure.
- Ensure and retain documentation of inspection and maintenance.
- Provide fire extinguishers and ensure operators are knowledgeable in its use.
- Maintain crane or hoist and its accessories in a condition that will not endanger an operator or other employee.

### **12.5.4.2 Employee**

- Understand the requirements relating to the safe operation, maintenance, and how to conduct daily inspections.
- Report defects in crane or hoist or associated accessories to supervisor.
- Utilize personal protective devices for directing a lift in required work areas.
- Test cranes or hoists operations if has not been used in the past 12 months.
- Do not carry suspended load over an employee.

## **12.5.5 REQUIREMENTS**

### **12.5.5.1 Hoist Operating Rules**

1. Never lower the block below the point where less than two full wraps of rope remain on the hoisting drum.
2. Be sure everyone in the immediate area is clear of the load and aware that a load is being moved.
3. Do not make lifts beyond the rated load capacity of the crane or hoist; sling chains, rope slings, etc.
4. Make certain that before moving the load, load slings, load chains, or other load lifting devices are fully seated in the saddle of the hook.
5. When a duplex hook (double saddle hook) is used, a double sling or choker should be used to assure that the load is equally divided over both saddles of the hook.
6. Check to be sure that the load is lifted high enough to clear all obstructions and personnel when moving the bridge or trolley.

7. At no time should a load be left suspended from the crane or hoist.
8. Do not lift loads with any sling hooks hanging loose.
9. All slings or cables should be removed from the crane hooks when not in use.
10. Do not block, adjust or disconnect limit switches in order to go higher than the switch will allow.
11. Limit switches should be tested in stopping the hoist at the beginning of each shift, or as frequently as otherwise directed.
12. Loads should not be moved or suspended over people.
13. If the electric power goes off, place your controllers in the OFF position and keep them there until power is again available.
14. Before closing main or emergency switches, be sure that all controllers are in the OFF position so that the crane will not start unexpectedly.
15. Never attempt to close a switch that has an OUT OF ORDER or DO NOT OPERATE card on it, regardless of whether it is locked out or not.
16. Do not change fuse sizes. Do not attempt to repair electrical apparatus or to make other major repairs on the crane unless qualified and specific authorization has been received.
17. Load limit or overload devices shall not be used to measure loads being lifted. This is an emergency device and is not to be used as a production operating control.

#### **12.5.5.2 Crane Operating Rules**

In addition to the operating rules listed above for hoists (most of which are also applicable to cranes) the following rules are applicable specifically to cranes:

1. Crane controls should be moved smoothly and gradually to avoid abrupt, jerky movements of the load. Slack must be removed from the sling and hoisting ropes before the load is lifted.
2. Center the crane over the load before starting the hoist to avoid swinging the load as the lift is started.
3. Crane hoisting ropes should be kept vertical. Cranes shall not be used for side pulls.
4. Do not operate the crane if limit switches are out of order or if ropes show defects or wear.

5. Whenever the operator leaves the crane, this procedure should be followed:
  - a. Raise all hooks to an intermediate position.
  - b. Spot the crane at an approved designated location.
  - c. Place all controls in the OFF position.
  - d. Open the main switch to the OFF position.
  - e. Make a visual check before leaving the crane.

### **12.5.5.3 Crane and Hoist Inspection Requirements**

#### **12.5.5.3.1 Pre-Use Inspection**

Before operating any crane, the operator should first check the following items. If any are found defective, the crane should not be used until corrections have been made.

1. Brakes - should be able to suspend the load.
2. Controls - should be clearly labeled and not malfunctioning.
3. End stops - should be in place.
4. Hoist cables - should not be frayed or kinked and there should be no broken wires.
5. Hook - should not be deformed or stretched. Safety latch should be present.
6. Warning light, bell, and/or horn - should be operational.
7. Limit switches - when hoist is run to top, limit switch should engage and stop hoist before it strikes the hoist block.
8. Slings/chains - should not show signs of excessive wear, such as red threads exposed on a nylon sling.

#### **12.5.5.3.2 Daily Inspection (or each time the unit is used)**

1. Visually inspect operating mechanisms, test controls and limit switches.
2. Visually inspect air and hydraulic systems for leaks.
3. Visually inspect hooks for deformation and cracks.
4. Visually inspect chains and wire rope for elongation, twists, broken wires and kinks.
5. Visually inspect rope receivers for proper seating in drum and sheave grooves.

#### **12.5.5.3.3 Monthly to Quarterly Inspections**

1. Check operating mechanisms for wear distortion and fractures.
2. Check limit switches for adjustment and wear.
3. Check air systems for leaks.
4. Check hydraulic systems for leaks and worn connectors and hoses.
5. Check chain links for elongation and wear.
6. Inspect wire rope for wear and broken strands.
7. Inspect slings for wear.

8. Visually inspect rope receivers for proper seating in drum and sheave grooves.
9. Check drive chain for stretch.
10. Inspect brake system for adjustment and wear.
11. Check the tightness of fasteners.
12. Inspect electrical components for function, loose connections and deterioration.
13. Inspect other aspects of the hoist/crane and peripheral apparatus for performance and safety requirements.

#### **12.5.5.3.4 Annual Inspection**

1. Inspect chain drive sprockets for wear.
2. Inspect sheaves for wear and cracks.
3. Inspect lock and clamp mooring devices for wear, distortion and fractures.
4. Inspect Quarterly inspection requirements.

### **12.5.6 TRAINING**

The supervisor must train a prospective crane or hoist operator before their assigned job task in the following:

1. Capabilities of equipment and attachments.
2. Purpose, use, and limitations of controls.
3. How to make daily checks.
4. Practice in operation assigned equipment through its functions necessary to perform the required job.
5. Review of applicable state standards.

#### **12.5.6.1 Testing**

The supervisor must test the knowledge and ability of an employee before authorizing him or her to operate a crane or hoist in the following:

1. Operating ability.
2. Knowledge of equipment.
3. Knowledge of daily checks.
4. Knowledge of applicable requirements.

### **12.5.7 REFERENCES**

*For additional information regarding standard hand signals for controlling cranes and hoist, refer to MIOSHA, General Industry Safety Standard Part 18 “Overhead and Gantry Cranes”. For additional information regarding accessories to cranes and hoists such as slings and fixed ladders refer to this manual Section 12.19 “Slings” and Section 12.10 “Ladder Safety”, as well as the MIOSHA, General Industry Safety Standard Part 49 “Slings” and Part 3 “Fixed Ladders”.*

## **12.6 ELECTRICAL SAFETY RELATED WORK PRACTICES**

### **12.6.1 PURPOSE**

The electrical safety related work practices requirements defines minimum safety standards for the practical safeguarding of persons and property from hazards arising in the design, installation, operation and maintenance of electrical equipment. Compliance with these standards and practices and when used in conjunction with those of nationally recognized standards, such as the National Electric Code and manufacturers recommendations, should result in a reasonably safe installation.

### **12.6.2 SCOPE**

This standard establishes requirements for qualified and non-qualified persons who work on, near, or with installations of electrical conductors and equipment. These requirements apply to both interior and exterior work on any state property.

*For additional information regarding working with electricity refer to Section 10.2 "Control of Hazardous Energy (Lockout/Tagout)" and Section 10.3 "Electrical Power Generation Transmission and Distribution (high voltage applications)".*

### **12.6.3 DEFINITIONS**

Authorized Employee means a person who is required to lockout machinery in order to perform service or maintenance.

Affected Employee means an employee whose job requires them to operate or use a machine/equipment on which servicing or maintenance is being performed under lockout, or if they are in the area where lockouts take place.

Blocking means any procedure to ensure that stored or potential energy, such as compressed air, hydraulic systems, springs, etc., is made non-operational.

Bonding means two conducting items, individually grounded, which are bonded or connected to each other.

Devices mean any unit in an electrical system that is intended to carry current but not utilize or use the electrical energy to perform some useful work.

Equipment Utilization means any system component that uses electrical energy to perform some useful work, either mechanical, chemical, heat, light or similar.

Exposure Sign means any exposure to an non-insulated energized part that has not been locked, tagged and cleared for work and said part would not require a specific purposeful and intentional act to come into contact with the part.

Fixed means fastened in place requiring the release of latches and such possibly by hand or fastened in place requiring the use of tools.

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Ground means a conducting connection, whether intentional or accidental, between an electrical circuit or equipment and the earth, or to some conducting body that serves in place of the earth.

Intrinsically Safe means not capable of releasing sufficient electrical or thermal energy under normal or abnormal conditions to cause ignition of a specific flammable or combustible atmosphere mixture in its most ignitable concentration.

Intrinsically Safe Apparatus means devices or apparatus connected to an intrinsically safe circuit.

Intrinsically Safe Source Device means a device that is not intrinsically safe itself but which is relied upon to render its roadside circuit and apparatus intrinsically safe. Such items must be listed/labeled by a recognized testing laboratory for its use.

Non-Portable means any and all items that are not portable or fixed.

Portable means any item that weights less than 50 pounds, is readily carried by a person and, for utilization equipment, is cord and plug connected and 1/3 horsepower or less.

Qualified Persons means one who is thoroughly trained and understands the hazard involved in any area which may be within their job description or assigned responsibility, such as construction, installation, operation and maintenance of electrical apparatus.

Switch or Disconnect means a switch designed and rated to interrupt current.

Switch, Isolation means a switch designed to give discontinuity in an electrical circuit, but not rated to interrupt current.

Utilization Equipment means equipment that uses electric energy for electronic, electromechanical, chemical, heating, lighting or similar purposes.

### 12.6.4 RESPONSIBILITIES

#### 12.6.4.1 *Management*

Certain concepts in electrical safety are basic to all operations at DMB property management facilities. All electrical installations are required to meet the appropriate recognized codes including but not limited to the National Electrical Code, National Fire Protection Code and applicable local code requirements (i.e., BOCA). Specialized safety requirements are the responsibility of the electrical supervisor or Safety and Health Coordinator. Management responsibilities include:

- Instruct employees in the safe operation of electrical safety work practices along with the required safeguards and associated hazards.



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- Maintain equipment and make sure employees are properly trained in the use of equipment.
- The DMB Safety Coordinator and electrical trades' supervisor may waive specific requirements or permit alternate methods when assured that equivalent objectives of establishing and maintaining effective safety can be achieved.
- Management will assure that personnel permitted to perform construction and/or maintenance work on electrical equipment and installations are authorized by local management, based on qualifications, and must be specifically assigned.
- Portable ladders must have nonconductive side-rails when working around exposed energized parts.

### **12.6.4.2 Employee**

- Understand the requirements relating to safe care, use and operation of electrical equipment, exposures and other related safeguards.
- Wear necessary personal protective equipment where needed.
- Report any known hazards or defects in equipment or protective apparatus to supervisor.
- Follow all safety-related requirements.
- Report unsafe conditions such as the following to your supervisor.
  1. Shocking, sparking, overheating or smoking machinery
  2. Corroded outlets, switches and junction boxes
  3. Extension cords in permanent use
  4. Exposed wiring, broken plugs, outlets, or walls, missing box covers or faceplates
  5. Outlets in damp areas without GFCIs

## **12.6.5 REQUIREMENTS**

### **12.6.5.1 Signs and Barriers**

Adequate barriers, danger signs, locks, enclosures, etc., must be provided to protect personnel from accidental contact with energized parts and prevent unauthorized operation.

#### **12.6.5.2     *Lockout Procedure and Requirements***

Whenever equipment is being repaired, cleaned, inspected, oiled, adjusted or serviced in any appropriately hazardous way, the switch controlling all sources of electrical power for the equipment must be opened, locked with a padlock and tagged with a “Do Not Operate” tag. Additionally, all non-electrical power sources must be rendered safe.

#### **12.6.5.3     *Working on Energized Parts***

Persons who perform troubleshooting on energized circuits must be qualified journeyman electricians or an apprentice electrician under the direct supervision of a journeyman electrician. Repair activities must be performed only after equipment has been de-energized except as identified above.

#### **12.6.5.4     *Understanding the Equipment***

Qualified persons must learn and understand the manufacturer’s instructional information.

All personnel must be familiar with general lockout requirements.

#### **12.6.5.5     *Clearing Equipment for Work***

All persons must consider all circuits and equipment as live at all times until completely de-energized, tested, grounded, tagged or properly identified and released for work.

#### **12.6.5.6     *Cleaning of Equipment***

No cleaning or similar work must be done within the reach of parts or equipment unless such parts have been de-energized and prepared for work.

#### **12.6.5.7     *Carrying Equipment and Tools***

All persons must at all times be aware of the hazard associated with carrying and placing equipment and tools such as ladders, brooms, mops, lamp holders, tool belts, tool boxes, keys, etc., in places where circuits may become energized.

#### **12.6.5.8     *Removing Tools***

All persons will exercise care in not leaving tools or keys on buses, doors, panels, equipment cases or tanks, rotating machines and in or on compartments.

#### **12.6.5.9      *Qualified Persons***

Qualified persons must be trained and demonstrate competence in the following work practice requirements:

1. Skills and techniques necessary to distinguish exposed live parts from other parts of electrical equipment.
2. Skills and techniques necessary to determine the nominal voltage of exposed live parts.
3. Minimum approach distances corresponding to the voltage to which the qualified person will be exposed.
4. The proper use of special electrical contact precautionary techniques.
5. The proper use of personal protection equipment.
6. The proper use of insulating and shielding materials.
7. The proper use of insulated tools for working on or near exposed energized parts of electrical equipment.
8. Knowing how to summon and or administer first aid.
9. Knowing how to summon and or administer cardio-pulmonary resuscitation (CPR).
10. Demonstrate proficiency in related work practices involved.
11. Be certified as an “*authorized employee*” having completed the training requirements herein.

*All other persons, without exception, are unqualified persons.*

#### **12.6.5.10      *Electrical Personal Protection Tools and Equipment***

##### **12.6.5.10.1      *General Requirements***

1. Authorized employees exposed to potential electrical hazards must be supplied with, and use, electrical protective equipment rated and otherwise appropriate for the task.
2. Specially designed insulated equipment must bear a permanent mark to show the manufacturer's name or trademark and certification of compliance with the *appropriate American National Safety Institute / American Society for Testing and Materials (ANSI/ASTM) standard*.
3. Personnel must use equipment that is rated and capable of withstanding the imposed voltage.

**12.6.5.11 *Personal Protective Equipment, Tools and Their Application***

1. Fuse handling equipment insulated for the circuit voltage, must be used to remove or install fuses when the fuse terminals are energized.
2. Head protection that is non-conductive must be used when there is the potential for head contact with exposed energized parts. Class B helmet.
3. Eye and face protection, such as a shade #2 face shield with safety glasses, must be worn when there is the potential for an electrical flash or explosion. Depending on type of bus duct this may include bus plug installation.
4. Employees exposed to electrically energized equipment must wear electrical hazard footwear, designed to provide extra insulation and retard electrical conduction.
5. Insulating gloves of an appropriate voltage class (Class 0: less than or equal to 1,000 volts, Class 2: less than or equal to 17,000 volts) must be worn when there exists potential contact with high voltage conductors.
6. Insulating gloves of an appropriate voltage Class 0: less than or equal to 1,000 volts, Class 2: less than or equal to 17,000 volts) must be worn when the potential exists for contacting energized equipment or lines.
7. Insulating barriers must be used when an employee is within reach of energized equipment from 750 to 28,000 volts phase to ground. The energized equipment must be isolated or covered by at least one: insulating blanket, insulating hood, insulating line hose, or insulating barrier.
8. Insulated platform, boards or insulated aerial basket must be used when in reach of energized equipment at more than 5,000 volts phase to ground.
9. Protective shields, barriers or insulating materials must be used to protect employees from electrical hazards while working within 1'-0" of exposed energized parts of 300 volts phase to phase. When normally enclosed live parts are exposed for maintenance or repair, they must be guarded to protect passersby from contact.
10. Insulated tools and handling equipment are required when working near exposed energized equipment.
11. Signs, tags, barricades or attendants must be used when necessary to warn and prevent unauthorized employees from entering a hazardous area.
12. Clothing worn must not contain any nylon, polyester, rayon, acetate, or other material that when exposed to flames or electric arcs could increase the extent of injury.

#### **12.6.5.11.1 Care and Maintenance**

1. Protective equipment must be maintained in a safe and reliable condition and periodically inspected.
2. If the insulating capability of protective equipment is subject to damage during use, the insulating material must be protected. An example is an outer covering of leather used to protect rubber-insulating materials.
3. All insulating equipment must be visually inspected for cracks, thin spots, cuts, punctures, snags, scuffs and foreign substance before each use. Insulated gloves must be manually air- tested daily before starting work.
4. Insulating sleeves and blankets must be visually inspected and electrically tested by a qualified test facility within 12 months of purchase and at least every 12 months thereafter. The electrical test must be conducted in accordance with applicable *ANSI/ASTM standards*. The equipment must be dated or coded with the date of purchase or issuance and the date of each periodic test.
5. Rubber insulating gloves must be given an electrical test in accordance with applicable ANSI/ASTM standards. The following test must be conducted:
  - a. Gloves in use - at least every 6 months.
  - b. Gloves tested but not issued for service - at least every 12 months.

Equipment not meeting the electrical test requirements, visual inspection, or manual air test must be removed from service. Insulating gloves, sleeves, blankets and other insulated equipment must be stored in a bag, box, compartment or container designed and used exclusively for their storage and must not be folded, creased or compressed. Insulated equipment must be kept free of ozone, chemicals, heat, oils, dirt, solvents, damaging vapors, fumes, electrical discharges, acids and sunlight.

#### **12.6.5.12 Preventive Maintenance**

Routine maintenance of all electrical equipment is important to ensure safety and continuity of production. Therefore, preventive maintenance and inspections must be scheduled and performed on a regular basis using equipment manufacturers' recommendations and plant experiences as a guide.

**12.6.5.13 Grounding/Bonding**

1. The resistance of all new ground fields must be measured when the fields are installed and the results reported to the electrical trades' supervisor or the facility manager.
2. A visual inspection and connections tightness of grounds must be made annually and additional resistance tests made if ground is suspect.

**12.6.5.14 Portable Tools and Equipment Grounding**

1. The tool must have a 3 conductor cord with 2 pole, 3 wire polarized plugs for single phase circuits and a 4 conductor cord with 3 pole, 4 wire polarized plug for 3 phase circuits.

An exception is an approved double insulated tool.

2. Portable cord and plug equipment must be visually inspected before use to identify external defects. If defects are identified, the equipment must be tagged and removed from service until appropriate repairs can be made.

**12.6.5.15 Temporary Wiring**

1. Temporary wiring must only be used in areas under construction or repair, for experimental units and for operation of equipment during emergencies.
2. All temporary wiring must be adequately supported and protected. All equipment served by temporary wiring must be clearly identified with the name of the equipment served.
3. All temporary-wiring installations must be inspected and their necessity reviewed. Circuits not in use must be immediately removed. Circuits, which are required for operation, must be replaced with permanent installation as soon as possible.

**12.6.5.16 Disconnects and Isolation Devices**

1. All devices must be in accordance with nationally recognized equipment standards.
2. Disconnect switches must be quick-make, quick-break with interlocked door and have blades or contact that are visibly open when the device is in the off position and the door is open. It must be equipped with provisions for padlocking in the off position.
3. Circuit breakers may be used instead of switches if the breaker is equipped with provisions for padlocking in the off position. Provisions should be made to padlock any circuit breaker both new and existing.

4. The plug and receptacle serve as a disconnect for portable equipment.
5. Each piece of utilization equipment must have its own disconnect device.
6. Isolation switches are not to be used in place of disconnects.

#### **12.6.5.17 Motor Circuits, Controllers and Starters**

All motor circuits must be in accordance with the requirement of the appropriate article of the *National Electric Code*, latest edition.

#### **12.6.5.18 Portable Equipment**

1. A ground fault device must protect extension cords taken into high moisture areas.
2. The condition of portable electric tools and equipment is the responsibility of the supervisor whose employees are using them. A tool inspection program to evaluate the working condition of the tool is required periodically.
3. Electrical hand tools that have been repaired should either be ground checked or have the double insulation checked.

#### **12.6.5.19 General Safety Practices**

Each day electricity lights the office, runs the machinery, and heats the facility.

Electricity travels over "conductors" which are anything that allows electricity to flow. Electricity always tries to reach the ground. Excellent conductors include people, water, damp floors or metal. An "insulator" is the opposite of a conductor. Electricity cannot flow easily through insulators like plastic, rubber boots, dry wood or glass.

1. Adequate illumination must be provided when employees work in spaces, which may contain exposed energized parts.
2. Specific personal protection equipment needs must be reviewed and provided for employees who enter confined spaces, which may contain exposed energized parts.
3. Before an employee works with conductive or combustible materials and equipment around exposed, energized parts, additional work practices should be developed for the employee's safety.
4. Portable ladders must have nonconductive side-rails when working around exposed energized parts.

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5. Conductive apparel, such as jewelry, will not be allowed, unless rendered non-conductive.
6. Don't use any appliance or machinery while touching metal or anything wet.
7. Unplug machinery and appliances before cleaning, inspecting, or repairing.
8. Keep electrical equipment, machinery and work areas clean. Oil, dust, combustible waste and water can be fire hazards around electricity.
9. Keep access to panels and junction boxes clear.
10. Move flammable materials away from electric heat sources and lights.
11. Know the location of fuses and circuit breakers.
12. If you are not trained to work in high voltage areas, do not enter them, even in an emergency.
13. Make sure all electrical equipment is properly grounded.
14. Plug power tools into grounded outlets installed with Ground Fault Circuit Interrupters (GFCIs).
15. If someone has been shocked, ensure that the power supply has been turned off and administer first aid. If you can't turn off electricity, use an insulated material to separate the victim from the current.
16. Use "C" rated extinguishers for electrical fires. Never use water.

### **12.6.6 TRAINING**

Training must be completed for those employees who face a risk of electric shock that is not reduced to a safe level by wiring design and protection. This will include, but is not limited to, the following classifications:

1. Electrical and certain trades supervisors
2. Electrical engineers, assemblers, and technicians
3. Electricians
4. Equipment operators
5. Material handling operators
6. Mechanics and repairers \*
7. Painters \*
8. Stationary engineers
9. Welders

\* These classifications do not have to be trained if their work (or those they supervise) does not bring them close enough to exposed energized parts operating at 50 volts or more to ground for a hazard to exist.



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Training should include making the employee familiar with the expected safety related work practices respective to their job assignment.

In addition, qualified persons must receive training on:

1. The skills and techniques necessary to distinguish exposed live parts from other parts of electric equipment.
2. The skills and techniques necessary to determine the nominal voltage of exposed live parts.
3. The clearances and corresponding voltages to which the person will be exposed.
4. Review of the applicable MIOSHA regulations should be completed.

### **12.6.7 REFERENCES**

*For additional information regarding working with electricity refer to MIOSHA, General Industry Standard Part 85 “Lockout/Tagout”, Part 86 “Electric Power Generation, Transmission and Distribution”, and Part 40 “Electrical Safety-related work practices” and Part 39 “Design Safety Standards for Electrical Systems”.*

**DMB Safety and Health  
Policies and Procedures**

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## **12.7 EXCAVATING, TRENCHING, AND SHORING**

### **12.7.1 PURPOSE**

This section is intended to provide safe work requirement for employees involved in excavating, trenching and shoring.

### **12.7.2 SCOPE**

This section pertains to the digging of excavations and trenches in which an employee is required to enter. Requirements for shoring, safeguards and other supporting systems are specified within this work practice.

### **12.7.3 DEFINITIONS**

Angle of repose means the maximum permissible slope for the side of an excavation in excess of five feet depth.

Braces or struts mean the horizontal cross members as a shoring system that bear against the uprights or stringers.

Excavation means any man-made cavity or depression in the earth's surface, including its sides, walls, or faces, formed by earth removal. For purposes of this section, a trench is an excavation.

Hazardous atmosphere means an atmosphere, which, by reason of being any of the following, may cause death, illness, or injury:

1. Explosive
2. Flammable
3. Poisonous
4. Corrosive
5. Irritating
6. Oxygen deficient
7. Toxic
8. Otherwise harmful

Kickouts means the accidental release or failure of a stringer or brace.

Qualified person means a person who by possession of a recognized degree or certificate of professional standing, or who, by extensive knowledge, training and experience, has successfully demonstrated the ability to solve or resolve problems relating to the subject matter and work.

Sheet piling means a continuous row of timber or steel piles driven in close contact to provide a tight wall to resist internal pressure of water, adjacent earth, or other materials.

Sides (sometimes called faces or walls) means the vertical or inclined earth surfaces formed as a result of excavation work.

Slope means the acute angle formed by the side of a trench or excavation and the horizontal plane.

Soil means any of the following:

- "Clay" a very fine textured soil that derives its resistance to displacement from cohesion and may be:
  - a. Soft clay
  - b. Medium clay
  - c. Firm soil
  - d. Stiff clay
- "Fill" – a man-made soil condition that may be constructed of any type of soil or combination thereof.
- "Organic soil" – a soil that contains a significant amount of peat, muck, or marl.
- "Running soil" – any type of soil that has insufficient strength to stand unsupported. Running soil tends to run or slough into the excavation as the excavation is being dug.

Stringers mean the horizontal members of a trench shoring system whose sides bear against the uprights or earth.

Support system means the total system necessary to restrain the sides of an excavation from moving.

Tight sheeting means a continuous row of wood or steel sheets in close contact to provide a tight wall, but is not driven as with piling.

Toe of slope means the point at which the side of an excavation intersects the lowest level of the excavation.

Trench means an excavation having a depth greater than its width measured at the bottom.

Trench jack means a screw or hydraulic jack used as a brace in a trench shoring system.

Trench shield (sometimes called a trench box) means a trench shoring system composed of steel plates and bracing, welded or bolted together, which can be moved along as work progresses.

Uprights mean the vertical members of a trench shoring system.

## **12.7.4 RESPONSIBILITIES**

### **12.7.4.1 Management**

- Instruct employees in the safe operation of excavating, trenching and shoring, as well as, safe use of equipment and attachments used in such operations.

- Train employees on how to inspect, use and maintain related equipment.
- Assure employees follow the requirement of this section.
- Enforce the use of necessary personal protective equipment including seat belts where applicable.

#### **12.7.4.2 Employee**

- Understand the requirements relating to the safe care, use, and protection of equipment.
- Inspecting vehicles and equipment prior to use for damage or hazards.
- Report any damage or recognized hazards to supervisor.
- Wear and use personal protective equipment where applicable.
- Recognize when excavations require shoring and other forms of bracing to prevent trench engulfment.
- It is the responsibility of all employees involved in Excavating, Trenching, and Shoring to adhere to all of the rules in this section as well as specific examples illustrated in *MIOSHA Construction Safety Standard Part 9 "Excavating, Trenching, and Shoring"*. Part 9 contains illustrations covering hazardous exposures that may be encountered *showing illustrations covering hazardous exposures that may be encountered*.

### **12.7.5 REQUIREMENTS**

#### **12.7.5.1 Locating Utility Lines**

1. DMB employees must not excavate in a street, highway, public place, a private easement of a public utility, or near the location of a public utility facility owned, maintained, or installed on a customers premises, without first having ascertained the location of all underground facilities. Locating underground utilities can be coordinated by calling "Miss Dig" at 800-482-7171.
2. Once the location of utilities is received, employees will exercise reasonable care when working in close proximity to the underground facilities of any public utility.
3. If there is the possibility of the facilities being exposed, then hand digging must be employed.
4. When any contact with or damage to any pipe, cable or its protective coating, or any other underground facility of a public utility occurs, the public utility must be notified immediately. If an energized electrical cable is severed, an

energized conductor is exposed or there are dangerous fluids or gasses escaping from a broken line, employees must evacuate the area immediately.

#### **12.7.5.2      *Excavation, Soil Types, Water, and Slide Hazards***

1. If different textured soils are encountered in the side of an excavation, each soil type of the excavation must be cut to the proper angle of repose. (An exception exists for a slope that might not steepen between the toe of the slope and the ground level where soft clay or running soil is encountered in the lower cut).
2. If the excavation is a trench, a trench shoring system must be used or the sides must be properly sloped to protect against a cave-in.
3. An employee must not work in an excavation in which there is accumulated water or in which water is accumulating unless precautions have been taken to protect employees against the hazards posed by water accumulation.
4. If water is controlled or prevented from accumulating by the use of water removal equipment, a qualified person or appropriate monitoring system must monitor the equipment and its operation.
5. A qualified person must make ongoing inspections of an excavation or trench. After every rainstorm or other hazard-producing occurrence, an inspection must be made by a qualified employee for evidence of possible slides or cave-ins. Where these conditions are found, all work must cease until additional precautions, such as additional shoring or reducing the slope, have been accomplished.
6. An excavation that has been cut into a rock formation must be scaled to remove loose material.

#### **12.7.5.3      *Excavation; Obstructions; Retaining Materials; Egress; Guarding; Heavy Equipment.***

1. A tree, boulder, rock fragments, or other obstructions whose movement could cause injury to an employee must be removed or supported.
2. An excavation that an employee is required to enter must have excavated and other material stored and retained not less than two feet from the excavation edge.
3. When a shoring system is used, the system must be designed and used to resist the added pressure when heavy equipment, material handling equipment, or material is located near an excavation.
4. When mobile equipment is utilized or permitted adjacent to an excavation where the operator's vision is restricted, top logs or barricades must be utilized or a signal person must be used.

5. An excavation of 48 or more inches in depth and occupied by an employee must be provided with either a ladder, extending not less than three feet above the top, as a means of access, or with a ramp meeting the requirements of *MIOSHA, Construction Standards, Part 9 Sub-Rule 6*. Lateral travel along the wall of a trench to a ladder or other means of egress must not exceed 25 feet.

#### **12.7.5.4    *Atmospheric Testing and Controls***

To prevent exposure to harmful levels of atmospheric contaminants and to assure acceptable atmospheric conditions, all of the following requirements must apply:

1. Where oxygen deficiency or a hazardous atmosphere exists, such as excavations in areas where hazardous substances are stored nearby, the atmosphere in the excavation must be tested before employees enter excavations that are more than 4 feet deep.
2. Precautions must be taken to insure employees are not exposed to atmospheres containing less than 19.5% oxygen, toxic contaminants, or flammable gasses.
3. Take precautions, such as providing ventilation, to prevent employee exposure to an atmosphere that contains a concentration of a flammable gas in excess of 20% of the lower flammable limit of the gas.
4. When controls are used that are intended to reduce the level of atmospheric contaminants to acceptable levels. Conduct testing as often as necessary to ensure that the atmosphere remains safe.

*See Section 10.1 on Confined Space Entry.*

#### **12.7.5.5    *Excavation Angle of Repose Requirements***

1. Unless properly supported the side of an excavation more than five feet deep must be sloped as prescribed in *MIOSHA Part 9 Excavating, Trenching and Shoring*.
2. An excavation less than five feet deep must also be effectively protected when examination of the ground indicates hazardous earth movement may be expected.
3. If one side of a trench is less than five feet in depth and the other side is deeper than five feet, the side deeper than five feet must be protected. All excavating material must be placed on the low side if possible.
4. Special attention must be paid to the side that may be adversely affected by weather or moisture content.

**12.7.5.6     *Supporting Systems, Angle of Repose, TieBacks, Tight Sheeting, and Additional Bracing.***

1. The angle of repose and the design of the supporting system for the side of an excavation must be based on the evaluation of all of the following factors:
  - a. Depth of cut and type of soil.
  - b. Possible variation in the water content of the material while the excavation is open.
  - c. Anticipated changes in the material due to exposure to the air, sun, water, or freezing.
  - d. Load imposed by structures, equipment, overlying material, or stored material.
  - e. Vibration from traffic, equipment, or blasting.
2. A qualified person must design a support system. The design of the supporting system must remain at the job site. A qualified employee must approve changes from the design of the support system.
3. Tie rods and other forms of tiebacks used to restrain the top of sheeting must be anchored a minimum of 10 feet. The measurement to the anchor point must start at the intersection of an angle of repose with the surface of the soil restrained. The tie back and anchor must be capable of restraining any pressure exerted on the system.
4. When tight sheeting or sheet piling is used, pressure due to existing ground water conditions must be considered in the design. Sheet piling must be driven to the predetermined depth set forth in the required design.
5. Materials used for a supporting system must be in good serviceable condition. When timbers are used they must be sound and free of large or loose knots.
6. Tight sheeting must be braced or anchored at the bottom and along the vertical plane to prevent lateral movement.

**12.7.6     TRAINING**

Employees need to be instructed in the care, use, operation and hazards associated with excavating, trenching, shoring and other related operations before being assigned a job task by the employer. Training should consist of information contained within this work practice requirement and other information related to the type of work. Instruction can be on-the-job or classroom or a combination of both. The supervisor must retain training documentation.



### **12.7.7 REFERENCES**

*For additional Information refer to MIOSHA Construction Safety Standard Part 9  
“Excavation, Trenching and Shoring”.*

## **12.8 GENERAL SAFETY PROVISIONS**

### **12.8.1 PURPOSE**

The purpose of having a general provisions section is to provide a general overview of issues pertaining to the work environment designed to prevent and reduce injuries to employees. The section sets forth rules for safe use, operation, and maintenance of equipment and for safe work practices for DMB employees performing specific operations.

### **12.8.2 SCOPE**

These established rules apply to DMB personnel authorizing or performing general operations, to uphold their designated responsibilities, which in turn will result in efficient and safe performed operations. It is the supervisor's responsibility to ensure that the information and work practices contained herein are communicated and followed. These rules apply where they are not otherwise set forth in another standard.

### **12.8.3 DEFINITIONS**

Approved means approval by the director of consumer and industry services or his or her duly designated representative.

Confined Space means an enclosed space, such as a bin, furnace, cupola, tank, vessel, vault, or well.

Flammable means to ignite easily, burn intensely or to have rapid rate of flame spread.

Machine means a powered instrument or device that transmits force or motion in a predetermined manner. It may be fixed in place or transportable but is not hand held.

Pinch Point means a point at which it is possible to be caught between the moving parts of a machine, or between the moving and stationary parts of the machine or between material and any part of a machine.

Point of Operation means the point on a machine where is performed.

Power source means the energy supplied by hydraulic, pneumatic, electrical or other source.

### **12.8.4 RESPONSIBILITIES**

#### **12.8.4.1 Management**

- Comply with general safety requirements, which apply.

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- Provide training to each newly assigned employee regarding the operating procedures, hazards, and safeguards of the job.
- Do not knowingly authorize a process, machine, or equipment to be used, which does not meet applicable state safety standards.
- Establish, maintain, and assure the utilization of a Lockout/Tagout procedure as prescribed in *MIOSHA Part 85 "Control of Hazardous Energy"*.
- Provide a chain, bracket, or other device and assure its use at all times to restrain compressed gas cylinders from falling.
- Develop, maintain, and coordinate with employees an accident prevention program.
- Identify an unsafe machine, powered tool, and defective or damaged piece of equipment and permit the use of any device that could create a hazard.
- Do not knowingly permit an employee to work while under the influence of an intoxicating beverage or substance.
- Do not knowingly permit an employee to ride on a piece of equipment designed for only one person (the operator).
- Establish minimum clearance for activities in close proximity to energized electrical lines, gear, or equipment.

### **12.8.4.2 Employee**

- Do not operate a machine or equipment until trained in its operating procedures, hazards, and safeguards.
- Report to supervisor any recognized hazards.
- Use recommended personal protective equipment or devices
- Do not remove a guard or safety device except for authorized servicing and return guard after completed.
- Prohibit any act that would put another person in danger.
- Do not work while under the influence of an intoxicating beverage or substance.

## **12.8.5 REQUIREMENTS**

1. Proper PPE must be used and maintained in a manner to protect the employee from hazards.

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2. Authorized DMB management are responsible the operation of rented leased or loaned equipment.
3. General Housekeeping
  - a. Materials, including scrap and debris, must be piled, stacked, or placed in containers in a manner that does not create a further hazard to an employee.
  - b. All places of employment, aisles, passageways, storerooms, and service rooms must be kept clean and orderly free of slip/trip/fall hazards.
  - c. Areas must be free of accumulations of materials that would constitute a fire, explosion, or pest harborage.
  - d. Where employees are required to work in wet areas, drainage, false floors, or platforms, a slip-resistant mat must be used.
  - e. Rotting or putrid garbage must be in a covered container and disposed of frequently.
  - f. Where vegetation is a hazard, vegetation control must be used or other means of protection, such as, but not limited to a barrier, PPE, or medication.
4. Work in confined or hazardous spaces  
Employees required to enter into a confined or other hazardous space must follow the requirements in *Section 10.1 Confined Space Entry, and Section 10.9 "Personal Protective Equipment"*.
5. Lubrication must be accomplished by one of the following:
  - a. Manually, when the machine can be shut off and locked out.
  - b. Automatic pressure or gravity feed system.
  - c. An extension-pipe or tube leading to an area outside of guards or away from any other hazard.
  - d. Access through a guard opening must not exceed specifications listed in *MIOSHA, General Industry, Part 1 Table 2, "General Provisions"*.
6. Color-coding
  - a. Red must be designated for safety (emergency stop button, electrical switch, and other mechanical devices designed for emergency stop. Excluding cables)
  - b. Yellow must be the basic color designated for caution, marking physical hazards, (solid yellow, yellow with black stripes, or yellow with contrasting background can be interchangeable)
7. Aisles and Floors
  - a. When mobile equipment and employees use the same aisle, dock or doorway, clearances must be provided and maintained to assure safe passage for employees and equipment.
  - b. Properly mark or identify as an aisle.
  - c. Maintain free of holes, loose boards, and protruding objects, which would cause a hazard to an employee.
8. Dockboards
  - a. Dockboards must be of suitable construction capable of supporting the load, have handholds to facilitate handling and placement and be capable of being secured in position.

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- b. Wheel chocks or equivalent means must be used to prevent vehicle movement when a dockboard is in position.
- 9. The maximum designed safe load limit of a floor or roof must not be exceeded.
- 10. Safeguards
  - a. Means of power transmission such as, but not limited to belts, gears, shafts, pulleys, sprockets, spindles, drums, fly wheels, chains, and other reciprocating, rotating, or moving equipment parts, reference to *MIOSHA Part 7*.
  - b. Powered electrical equipment must be equipped with on/off switch.
  - c. Guards must be designed to prevent accidental actuation.
  - d. Precautions against automatic restart upon power restoration.
  - e. Guards must be secured to the machine or to a fixed object, the guard must not create an additional hazard to itself.
  - f. A standard barrier or enclosure, equipped with an interlock gate must guard exposed revolving barrel, container, or drum.
  - g. Blades of a fan located within seven feet of a floor or working level and used in process cooling must be guarded with a firmly affixed or secured guard, opening points are specified in *table 2 of MIOSHA Part I*.
  - h. When an employee is exposed to a hazard created by a pinch point other than the point of operation, the hazard must be guarded or the employee must be otherwise protected.
  - i. An employee must not place their body beneath equipment, such as vehicles, machines, or materials supported by jacks, overhead hoist, chain fall, or any other temporary supporting means, unless safety stands, blocks or other support systems are capable of supporting the total imposed weight.
- 11. Air under pressure
  - a. Air pressure at the discharge end of a nozzle or flexible hose cannot exceed 30 psi. when dead-ended.
  - b. Pressurized air should not be used for cleaning clothing or work areas.
- 12. Chemical Containers
  - a. Containers, which had previously contained hazardous chemicals, cannot be used for storing dissimilar chemicals unless all residue has been removed. Chemicals should always be stored in containers constructed of compatible materials.
  - b. Chemical containers should not be made available to employees or the public.

### 12.8.6 TRAINING

Employees need to be instructed in the care, use, operation and hazards associated with assigned tasks. Additional information relating to the identity of hazards associated with specific tasks, and required personal protective equipment is available through supervision or the DMB Safety & Health Coordinator. Training relating to these general provisions should be incorporated into site specific training requirements and the New Employee Orientation as applicable. Instruction can be on-the-job or classroom or a combination of both. The supervisor must retain training documentation.

## **12.8.7 REFERENCES**

*For additional information concerning general safety provisions refer to MIOSHA, General Industry Safety Standard and Construction Safety Standard Part I.*

*For additional information concerning Sanitation, Toilets, Washing facilities, food Handling, First Aid and Medical Service, and Illumination Refer to MIOSHA, Department of Consumer and Industry Safety Standard, Construction Safety Standards Part I “General Provisions”.*

*For additional information refer to MIOSHA Part 90 “Confined Space” and MIOSHA Part 33 “Personal Protective Equipment”.*

## **12.9 HAND AND PORTABLE POWER TOOLS**

### **12.9.1 PURPOSE**

The requirements stated within this work practice are established to prevent injury to employees who are required to work with various hand and portable powered tools.

### **12.9.2 SCOPE**

These work practices apply to any DMB employee with a job that consists of working with hand and portable powered tools. It is the supervisor's responsibility to ensure that the information and work practices contained herein are effectively communicated and enforced.

### **12.9.3 DEFINITIONS**

Chain Fall means a manually powered hoisting device employing a load bearing chain and an endless hand chain to raise or lower loads.

Explosive Load means a substance capable of producing a propellant force in a powder actuated tool.

Fastener Driver means a portable powered tool such as a nut runner, impact wrench, stapler, screwdriver, nailer and riveter.

Hammer Actuated Piston Tool means a device which when struck by a hammer and supplemented by an explosive load, moves a captive piston to drive a fastener into a work surface.

Hoist and Puller (sometimes called a come-along) means a portable, manually operated device for lifting, lowering or moving in a pulling force.

Hot Stick means a dielectric tool extension used when working on energized conductors and apparatus.

Jack Or Ram means a device, except an automobile bumper jack, used for lifting, lowering or moving a load by application of a pushing force.

Low Velocity means a device, which when used with an explosive load, propels a fastener at a velocity less than 300 feet per second when measured 61/2 feet from the muzzle end of the tool.

Mushroom means to overrun the shank or head of a tool by battering the striking end.

Platen Sander means a portable powered tool, which has abrasive paper fastened to a base or platen, which moves in orbital oscillating motion.

Pneumatic Powered Nut Runner means an air operated wrench, which is used to drive a threaded fastener into or onto a work piece.

Portable Powered Stapler and Nailer (other than general office staplers) means a tool which drives a staple or nail by mechanical, pneumatic, or electrical power into a work piece.

Portable Powered Tool means a tool carried and moved by hand and powered by something other than manual force.

Powder Actuated Tool means a device for making instantaneous forced entry into materials by use of a tool, a fastener and an explosive load.

Protective Shield means a device or guard attached to the muzzle of a power actuated tool to confine flying particles.

Rating means the maximum working load for which an object is designed to handle under given circumstances.

Stall Type Tool means a powered nut runner which stalls out under load but maintains pressure on the fastener until the power supply to the motor is manually terminated by means of a throttle release or other power disconnect.

#### **12.9.4 RESPONSIBILITIES**

##### **12.9.4.1 Management**

- Instruct employees in the safe operation of hand and portable powered tools along with the required safeguards and associated hazards.
- Train employees on how to inspect, operate and properly use hand and portable powered operated tools.
- Assure that all employees using hand or portable powered tools use the necessary personal protective equipment.
- Maintain equipment in a condition, which will not create a hazard for employees.

##### **12.9.4.2 Employee**

- Understand the requirements relating to the safe use of such tools along with the required safeguards and associated hazards.
- Inspect hand and portable powered operated tools for damage that could be hazardous.
- Report any defects of tools to supervisor for proper repair or replacement.
- Do not use a tool for other than its designed or approved use.



### **12.9.5 REQUIREMENTS**

1. A hand tool or portable powered tool must be stored in a manner to prevent damage, which would make the tool unsafe for use.
2. A sharp or pointed end tool, such as, but not limited to chisels, drill bits, and awls shall be carried in one of the following ways:
  - a. With the edges of the points protected
  - b. In a tool tray
  - c. In a cart
  - d. In a sheath
  - e. In the hand with sharp edges turned away from the body
3. A sharp or pointed tool, when stored in a rack or bin, shall have the sharp end or point inward or otherwise protected or stored to prevent injury.
4. An electrically powered tool shall have an approved ground unless it is double insulated and carries a permanent label or marking.
5. Safety devices and operating controls shall not be made inoperative.

#### **12.9.5.1 Inspection**

1. A portable pneumatic grinder not legibly marked with the manufacturer's rated speed must not be used. It is necessary to be able to match the speed of the wheel to the grinder speed.
2. A tool shall be inspected visually by the employee using the tool, for safe operation before daily use, and when found defective, it shall be removed from service.

##### **12.9.5.1.1 Chain Falls And Hoist Units**

1. A chain fall or hoist unit must not be used for more than its rated capacity.
2. A chain fall, hoist unit or puller must be visually inspected for observed defects before each use.

##### **12.9.5.1.2 Hot Sticks**

1. A hot stick and any tool attached to it must be cleaned and inspected for damage before use.
2. A hot stick, which has been damaged, must not be used until replaced or repaired by a knowledgeable employee or an outside service and tested to meet requirements of the standard.

#### **12.9.5.1.3 Chain Saws**

1. A chain saw must be only used for cut-off work such as but not limited to, cutting trees, limbs, poles and beams.
2. A chain saw must not be used to open a hole in a solid object such as a floor, wall or panel.
3. A chain saw's moving parts, such as a flywheel, rotating screen or clutch, shall be guarded.
4. A saw's chain must be guarded adjacent to the handle area and the sawdust directed away from the operator.

#### **12.9.5.1.4 Safe Work Practices**

1. Eye protection must always be worn when working with portable power tools.
2. A face shield must be worn when grinding.
3. Gloves and arm guards must be worn when working with sharp or hot objects.
4. Hearing protection must be worn when the noise level of your work area exceeds 85 dBA. You may request to use it for any job.
5. Select the right tool for the job. Examples of unsafe practices include:
  - a. Striking hardened striking surfaces of hand tools together, such as a hammer to strike another hammer or hatchet or claw hammer to strike a steel chisel. Hardened metals will fragment and become dangerous projectiles.
  - b. Using a file or a screwdriver to pry; the file may break and cause injury.
  - c. Using a wrench instead of a hammer; the wrench may break.
  - d. Using pliers instead of the proper wrench; pliers slip easily and often contribute to injuries.
  - e. Make sure the tool is in good working condition. Unsafe tools include wrenches with cracked or worn jaws; screwdrivers with broken tips, or split or broken handles; hammers with chipped, mushroomed, or loose heads and broken or split handles; mushroomed heads on chisels; dull saws; and extension cords or electrical tools with broken plugs, improper or removed grounding systems, or split insulation.
6. Keep tools in a safe place. Do not leave the cutting edge of knives, chisels, and other sharp tools exposed when carrying them in pockets or leaving them in toolboxes.

7. Use battery powered tools outside, if possible.
8. Use double insulated tools connected to a circuit protected by a ground fault circuit interrupter (GFCI).

#### **12.9.6 TRAINING**

Employees need to be instructed in the care, use, operation and hazards associated with Hand and Portable Powered Tools and related equipment before being assigned a job task by the supervisor or facility manager.

Training should consist of information contained within this work practice requirement and other information related to the type of equipment and its use within a specific work assignment. Instruction can be on-the-job or classroom or a combination of both. The trades' supervisor must retain training documentation.

#### **12.9.7 REFERENCES**

*For additional information regarding hand and portable powered tools refer to MIOSHA General Industry, Part 38 "Hand and Portable Powered Tools" and Construction Safety Standard Part 19 "Tools".*

## **12.10 LADDER SAFETY**

### **12.10.1 PURPOSE**

The following requirements apply to the maintenance, use and storage of portable ladders throughout DMB facilities (interior and exterior applications). The requirements stated within this work practice are established to prevent injury to employees who are required to work with various forms of portable ladders.

### **12.10.2 SCOPE**

The requirements stated herein apply to a wide range of tasks which require the use of ladders. It is the supervisor's responsibility to ensure that the information and work practices in this standard are effectively communicated and followed. In addition, any special considerations from the manufacturer of the ladder will also be evaluated as to the application of specific types of equipment.

### **12.10.3 DEFINITIONS**

Brand means marking by burning with a hot iron.

Check means a lengthwise separation of wood less than 6 inches in length and 1/2-inch deep

Cleats mean a ladder's crosspieces of rectangular cross-section placed on edge on which a person may step to ascend or descend.

Crack means a separation of wood cells across the grain line.

Decay or rot means the disintegration of wood substance due to action of wood-destroying fungi.

Extension Ladder means a non-self supporting portable ladder adjustable in length. It consists of 2 or more sections traveling in guides or brackets so arranged as to permit adjustment of the ladder's length. Its size is designated by the sum of the lengths of the sections measured along the side rails.

Extension Trestle Ladder means a self-supporting portable ladder, adjustable in length, consisting of a trestle ladder base and a vertically adjustable single ladder, with suitable means for locking the ladder together.

Ladder means an appliance, which usually consists of 2 side rails joined at regular intervals, by crosspieces called steps, rungs or cleats, on which a person may step to ascend or descend.

Ladder Stand means a mobile, fixed size, self-supporting ladder consisting of flat treads in the form of stairs and may include handrails.

Pitch means the included angle between the horizontal and the ladder, measured on the opposite side of the ladder from the climbing side.

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Platform Ladder means a self-supporting type of stepladder of fixed size with a platform provided at the working level. The size is determined by the distance along the front rail from the platform to the base of the ladder.

Portable Ladder means a ladder not permanently fixed in place and which may be used at various locations.

Rungs mean a ladder's crosspieces of circular or oval cross section on which a person may step to ascend or descend.

Safety Feet means a safety device placed on the foot of the side rails to reduce the likelihood of the base slipping. Safety feet may be flat pads covered with a non-slip material, pointed metal projections, or spur wheels.

Sectional Ladder means a non self-supporting portable ladder, consisting of 2 or more sections so constructed that the sections, when combined by interlocking, will function as a single ladder, its size is designated by the overall length of the assembled sections. It is not adjustable.

Single Ladder means a non-self-supporting portable ladder, nonadjustable in length, consisting of only one section.

Special-Purpose Ladder means a portable ladder, which represents either a modification or a combination of design or construction features in one or more of the general-purpose types of ladders, in order to adapt the ladder to special or specific uses.

Split means a lengthwise separation or lateral fault along the grain line; a tearing apart of the wood from one surface to the opposite or adjoining surface.

Stepladder means a self-supporting portable ladder, non-adjustable in length, having flat steps or a hinged back. Its size is measured along the front edge of the side rails.

Steps mean the flat crosspieces of a ladder on which a person may step to ascend or descend.

Trestle Ladder means a self-supporting portable ladder, non-adjustable in length, consisting of 2 sections hinged at the top to form equal angles with the base. The length of the side rails measured along the front edge designates the size.

Worn means the reduction of a dimension of wood or non-wood part by more than 10% of its original size.

## 12.10.4 RESPONSIBILITIES

### 12.10.4.1 *Management*

- Provide a training program for each employee in the proper and safe use of ladders.
- Purchase ladders that have been manufacturer tested and rated.
- Allow only employees that apply to weight rating capacities to use the specific ladder.

### 12.10.4.2 *Employee*

- Be able to apply training, during the procedures of erecting, maintaining, and disassembling ladders and fall protection devices.
- Never carry objects while climbing or descending a ladder.
- Report a damaged or defective ladder to a supervisor.

## 12.10.5 REQUIREMENTS

### 12.10.5.1 *General*

A wood ladder purchased must bear a brand to show the manufacturer's name, or an appropriate abbreviation thereof, or private label, the last 2 numbers of the year manufactured, ladder grade, and certification of compliance with *United States American Standards, A14.21972*.

The required information may be stamped into a guide iron on an extension ladder or the metal support of a step ladder cap. Each section of an extension or trestle ladder must bear the required information.

A nonwood ladder purchased must bear a permanent mark or a permanently attached tag, giving the manufacturer's name or private label and the last 2 numbers of the year manufactured, ladder grade and certification of compliance with the *American Standard Association, A14.21972*.

### 12.10.5.2 *Cleat Ladders*

1. A cleat ladder which is longer than 22 feet must not be used.
2. Wood in a cleat ladder must be straight grained and knot free.
3. Wood side rails of a cleat ladder must not be less than 2 by 4 inches nominal. Wood cleats of a cleat ladder may not be less than 1 by 4-inches nominal.

4. The distance between the side rails of a cleat ladder must be at least 14 1/2 inches, but not more than 16 1/2 inches.
5. Wooden cleats must be inset into the 2 side rails of a cleat ladder not less than 1/2 inch or attached directly to the edge of the side rails. The cleats must be fastened to each rail by at least 3 size 10-d wire nails.

#### **12.10.5.3 Ladder Stands**

1. A ladder stand must be capable of sustaining the specified load.
2. The load, which must be calculated on the basis of 1 or more 200-pound employees, together with 50 pounds of equipment each, must be applied uniformly to a 31/2inch wide area, front to back, at the center of the width span, with a safety factor of 4.
3. The *maximum* height at the working level must be not more than 4 times the minimum base dimension. A ladder stand, which does not meet this requirement, must be provided outrigger frames to achieve this least base dimension.
4. The step width must be not less than 16 inches and the steps must have a slip resistant surface.
5. Not less than 2 of the 4 casters of a ladder stand must be the swivel type and the caster must be provided with positive wheel lock, swivel lock or both to prevent movement.
6. Steps must be uniformly spaced and sloped, with a rise of not less than 9 inches nor more than 10 inches, and a depth of not less than 7 inches. The slope of the step section must be a minimum of 55 degrees and a maximum of 60 degrees, measured from the horizontal.
7. Handrails must be a minimum of 29 inches high. Measurements must be taken vertically from the center of the step. Units having more than five steps, or 60 inches vertical height to the top step, must be equipped with handrails.

#### **12.10.5.4 Handling and Transporting Ladders**

1. A ladder must be handled with reasonable care and not subjected to deliberate dropping or to misuse. A ladder must not be used as a plank or skid.
2. A ladder, which is carried on a vehicle, must be secured to prevent it from catapulting or falling from the vehicle.

#### **12.10.5.5 Maintenance**

1. A wood ladder must not be painted with an opaque material. A ladder, particularly one used out of doors should be coated with a suitable transparent protective material to retard splintering caused by weathering.
2. The side rails and legs of a ladder must be kept free from splinters. The joint between the side rail and step must be kept tight, and metal hardware and fittings secured.
3. A ladder including its safety feet must be kept free of oil, grease, mud or any similar slippery substances.
4. The locks, pulleys, spreader joints or other movable metal parts of a ladder must operate freely without undue play. Lubricants must be applied as needed.
5. A rope used on a ladder must not have a long or loosely twisted lay, must be free of burns and cuts and must not show evidence of weakness resulting from fraying, wear, mildew or rot. Rope ends must be fastened or whipped.

#### **12.10.5.6 Inspection, Repair or Replacement**

1. A ladder must be inspected before it is used and after it has fallen or been involved in an accident to determine its condition. A ladder must be repaired or replaced if it shows:
  - a. Splits in side rails through to opposite surfaces in excess of 3 inches at the rungs or 6 inches along the rails. Splits singly or in combination along the same grain line must not exceed 6 inches in any 1-foot. Splits through to the opposite broad faces exceeding 6 inches but not more than 1 1/2 feet in length in single *or* combined lengths may be closed with a 3/16 inch diameter wagon box-head rivet centrally located in the narrow face of the rail. Where the split runs through rung holes, the rivets must be placed approximately 2 inches from the center of each rung so effected. This subdivision does not refer to checks in a ladder.
  - b. Gouges, dents or other damage that may be dressed smooth if the rail is not reduced by more than 10% of the thickness or depth. Damage to corner edges, including splits, may be dressed to a smooth bevel, if the cross section is not reduced by more than 10% of its original area.
  - c. Worn, crushed, cracked, split, splintered or missing rungs, steps, tops or platforms.
  - d. Longitudinal play of 3/4 inch in the rails due to looseness of rungs or steps.
  - e. Broken or bent guide irons, spreaders or locks.
2. A ladder with a defect must be tagged, "Dangerous Do Not Use" and it must be removed from service for repair or destroyed. Improvised repairs must not be made.



#### **12.10.5.7 Use of Ladders**

The following guidelines apply as requirements for the general use of portable ladders:

1. A ladder must not be placed in front of a door, which opens toward the ladder unless the door is blocked open, locked, guarded by a person or protected by a barricade.
2. A ladder must not be placed on a box, barrel or other unstable base.
3. A climber must face the ladder when ascending or descending.
4. A ladder must not be used as a brace, skid, guy, gin pole, gangway, or for any other use than that for which it is intended.
5. A person on a single or sectional ladder must not over-reach, nor do any pushing or pulling that may cause the ladder to move or topple. If both shoulders are outside the side rail, the user is over-reaching.
6. The user must not stand astride a ladder and another object.
7. A single or sectional ladder manufactured pursuant to MIOSHA rules must not be used by more than 1 person at a time.

#### **12.10.5.8 Placement**

Workers should observe the following practices when placing ladders:

1. Place a ladder so that the horizontal distance from the base to the vertical plane of the support is approximately one-fourth the ladder's length between supports. For example, place a 12-ft. ladder so that the bottom (base) is 3 ft. away from the object against which the top is leaning.
2. Do not use ladders in a horizontal position as runways or as scaffolds. Single and extension ladders are designed for use in a nearly vertical position and cannot be used in a horizontal position.
3. Do not place a ladder against a window's pane or sash. Securely fasten a board (not with nails) across the top of the ladder to give a surface at each side of the window. Spread attachments are available. On wide windows with a metal sash, the bearing may be across the mullions or between the window jambs.
4. Place the ladder so that both side rails have secure footing. Provide solid footing on soft ground to prevent the ladder from sinking.
5. Place the ladder's feet on a level base and not on movable objects.

6. Never lean a ladder against unsecured backing, such as loose boxes or barrels.
7. When using a ladder for access to high places, securely lash or otherwise fasten the ladder (top and bottom) to prevent it from slipping.
8. Secure both the bottom and top of a ladder to prevent displacement when using a ladder for access to a scaffold.
9. Extend the ladder's side rails at least 3 ft. above the top landing.
10. Do not place a ladder close to electrical wiring or against any operational piping (acid, chemical, sprinkler system, etc.) where damage may be done. In such cases, use non-conductive plastic ladders.
11. Allow only one person at a time on a ladder.
12. Do not overload a ladder. Do not hit it.
13. Use ladders of sufficient length so that workers do not have to stretch or reach.

#### **12.10.5.9 *Ascending or Descending Ladders***

Workers will observe the following practices when ascending or descending ladders:

1. Hold on with both hands when going up or down. If material must be handled, raise or lower it with a rope either before going down or after climbing to the desired level.
2. Always face the ladder when ascending or descending.
3. Never slide down the ladder.
4. Be sure shoes are not greasy, muddy, or slippery before climbing.
5. Do not climb higher than the third rung from the top on straight or extension ladders, or the second tread from the top on stepladders.
6. Carry tools on a tool belt not in the hand.

#### **12.10.5.10 *General Practices***

When using ladders, workers will observe the following general practices.

1. Before using a ladder, inspect it for defects.
2. Never use a damaged ladder. Tag or mark it so that it will be repaired or destroyed.

3. Do not splice or lash short ladders together. They are designed for use in their original lengths and are not strong enough for use in greater lengths.
4. Do not use makeshift ladders, such as cleats fastened across a single rail.
5. Be sure that a stepladder is fully open and the metal spreader is locked before starting to climb.
6. Keep ladders clean and free from dirt and grease, which might conceal defects.
7. Do not use ladders during a strong wind except in an emergency and then only when they are securely fastened.
8. Do not use ladders as brace, or skid, or for other than their intended purposes.
9. Never attempt to adjust a ladder while a user is standing on the ladder. The adjustment of extension ladders should only be made by the user when standing at the base of the ladder.

#### **12.10.5.11 *Electrical Hazards and Metal Ladders***

Since metal ladders conduct electricity, do not use them around energized electrical circuits or equipment, or in places where they may come in contact with electrical circuits. The importance of these electrical hazards cannot be overemphasized. Plastic or fiberglass ladders, as well as wood ladders, should be considered for use near electrical hazards.

#### **12.10.5.12 *Use Of Stepladders***

1. A stepladder, which is being used, must be opened fully and its spreaders locked.
2. Each leg of a stepladder must be in contact with solid footing. A board or plank may be used to secure footing on uneven ground.
3. If a stepladder does not have a guardrail, the top step and cap must not be used to work from or to climb on.
4. A folded stepladder must not be used as a straight ladder by leaning it against a wall or other support.
5. When carrying objects up ladders, one hand should be kept free to maintain balance and security.
6. The bracing on the back legs of a step ladder must not be used for climbing,

### **12.10.5.13 Use Of Straight, Sectional, And Extension Ladders.**

1. A straight, sectional or extension ladder must be placed so that the side rails have a secure footing. Where the surface is uneven, boards, planks, or leveling jacks may be used to create an even surface. A straight, sectional, or extension ladder must have safety feet. The ladder must be placed so as to prevent slipping or it must be lashed or held in position.
2. A portable non-self-supporting ladder should be erected at a pitch of 75 degrees for maximum balance and strength. This may be accomplished by placing the base out from the wall or other support 1/4 of the working length of the ladder.
3. Ladders must not be tied or fastened together to provide longer sections other than with the hardware provided by the manufacturer.
4. A person using a straight or extension ladder must not stand on the top 2 rungs or within 3 feet from the top of the ladder.
5. If the top of the ladder is secured to an object, the user may secure themselves to the ladder by placing one leg over the second rung above the rung on which he is standing.
6. When using a ladder to go from one landing to another, the ladder must extend above the upper landing by not less than 3 feet.
7. The top rest for a straight or extension ladder must be reasonably rigid and must have ample strength to support the applied load.

### **12.10.5.14 Non-wood ladders**

#### **12.10.5.14.1 Ladder Construction**

1. The design and construction of a portable non-wood ladder must be such as to produce a ladder without structural defects or accident hazards such as sharp edges or burrs.
2. Rungs or steps of portable non-wood ladders must be corrugated, knurled, dimpled, coated with skid-resistant material, or otherwise treated to minimize the possibility of slipping.

#### **12.10.5.14.2 Specifications**

1. A non-wood straight or extension ladder must comply with rules 427 to 428, except a non-wood portable extension ladder with an interlocking rail section, such as a channel, must have not less than a single guide iron on each rail.

2. To be classified as a standard length ladder, the measured length must be within plus or minus 1/2 inch of the specified length. A non-wood stepladder, which exceeds 16 feet in length, must not be used. The bottom of each rail of a non-wood stepladder must have non-slip material.
3. A non-wood trestle ladder or extension sections or base section of a non-wood extension trestle ladder must comply with the section on portable ladder lengths.
4. The length of a non-wood platform ladder must not exceed 16 feet.
5. A non-wood platform ladder must comply with rule on portable stepladders.

#### **12.10.5.14.3 Non-Wood Ladder Care And Maintenance.**

1. A non-wood ladder must be inspected before being used and after it has fallen or been involved in an accident to determine its condition.
2. A non-wood ladder must be repaired or replaced if it shows: cracked, bent or twisted side rails or legs; rungs where opposite surfaces are bent or deformed; loose or broken rivets and bolts, or other fasteners; broken or bent spreaders, guides or locks.

#### **12.10.5.14.4 Use of non-wood ladders.**

1. A metal ladder, except a ladder provided and used by a life support organization such as a fire department, must not be furnished or used near an exposed or open electrical source.
2. A non-wood ladder must be used pursuant to rules in *Sections 12.10.5.7 and 12.10.5.12-13 Use of ladders, use of stepladders and use of straight, sectional and extension ladders.*
3. When in use, a non-wood, non-self-supporting ladder must be placed so that the 2 side rails are supported, unless equipped with a single attachment capable of supporting the imposed load.

### **12.10.6 TRAINING**

A supervisor shall ensure that all employees who use ladders that have a working height at or exceeding 6 ft. will receive training by a competent supervisor on how to inspect and properly use ladders. The supervisor must decide when retraining is needed for the employee. Incidents involving the improper use of ladders may indicate the need for additional training.

Training must include:

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1. The nature of fall hazards in the work area.
2. The correct procedures for erecting, maintaining, disassembling ladders and fall protection systems.
3. The proper cares, construction, handling, use, and placement of ladders.
4. The maximum intended load-carrying capacities of ladders that are used.
5. The rules and regulations herein.

### **12.10.7 REFERENCES**

*For additional information regarding specifications of ladders refer to MIOSHA, General Industry Safety Standard Part 3 “Fixed Ladders” and Part 4 “Portable Ladders”.*

*For additional information on Construction refer to the Department of Consumer & Industry Services, Construction Safety Standard Part 11 “Fixed and Portable Ladders”.*

*For additional information regarding fall protection refer to MIOSHA, General Industry Safety Standard Part 33 “PPE” or the Construction Safety Standard Part 45 “Fall Protection”.*

## **12.11 MACHINE GUARDS**

### **12.11.1 PURPOSE**

The following requirements relate to the safe operation, maintenance, and use of general machinery and the associated guarding required to ensure employee safety. The requirements stated herein reflect general requirements on a wide range of woodworking, metalworking, power transmission and associated types of equipment.

### **12.11.2 SCOPE**

These work practices apply to any DMB employee operating machinery or equipment. It is the supervisor's responsibility to ensure that the information and requirements contained herein are effectively communicated and enforced. Information provided by the manufacturer should be referenced for specific machine application, maintenance, and operation.

### **12.11.3 DEFINITIONS**

Belt includes any power transmission belt, including but not limited to, a flat belt, round belt, and V-belt, overhead chain and link belt. It does not include a conveyor belt.

Belt Shifter means a device for mechanically shifting belts from tight to loose idler pulleys or vice versa, or for shifting belts on cones of speed pulleys.

Exposed To Contact means that the location of an object is such that a person might come into contact with it and be injured.

Flywheel means such to include a balance wheel and a flywheel pulley mounted and revolving on the crankshaft of an engine or other shafting.

Gears mean a set or train of wheels or parts that engage another part by meshing teeth.

Guarded or Enclosed means that an object is covered, fenced, or surrounded so that it is not exposed to contact.

Nip-Point Belt and Pulley Guard means a device that encloses a pulley and is provided with rounded or rolled edge slots through which the belt passes.

Point of Operation means that point at which cutting, shaping or forming by a machine is accomplished upon stock and other points that may offer a hazard to the operator in inserting or manipulating stock in the operation of the machine.

Securely Fastened means that the safety device or object referred to shall be so secured in place that it cannot be moved under normal or reasonably foreseen conditions or circumstances.

#### **12.11.4 RESPONSIBILITIES**

##### **12.11.4.1 MANAGEMENT**

- Provide training to each employee informing them of the potential hazards, use and limitations of machine guards.
- Ensure guards are maintained and able to protect employee from potential hazard.
- Establish lockout/tagout procedures, as prescribed in Section 12.2 "Control of Hazardous Energy".
- Ensure guards are configured, modified, and designed not to create an additional hazard to the employee.
- Ensure employees wear necessary personal protective equipment.

##### **12.11.4.2 EMPLOYEE**

- Never remove, modify, and repair a guard, unless authorized to service or repair machinery, using lockout procedures.
- Report defective or damaged machinery, equipment, guarding or components to supervision.
- Replace guard after proper servicing.
- Wear necessary personal protective equipment.

#### **12.11.5 REQUIREMENTS**

1. Machine guards are used to protect against direct contact with moving parts at the point of operation and power transmission points. There are also guards designed to protect against flying chips, kickbacks, and splashing of metal or harmful liquids. Mechanical and electrical failures are also guarded against in many situations. Guards should also be engineered to give as much protection, as possible, even to machine operators who deliberately take chances or who are distracted or emotionally upset on the job.
2. Two types of guards are used to protect machine operators. These are fixed guards and interlocking and gate guards. Fixed guards are most commonly used and are preferred over others, because they protect the operator from dangerous parts of the machine at all times. Fixed guards may only be adjusted by authorized persons.
3. No guard shall be adjusted or removed unless authorized by the supervisor, or the employee concerned is specifically trained and the adjustment is considered a



normal part of the job.

4. No machine should be started without the guards in place. If you see that guards are missing or defective, report it to your supervisor immediately.
5. Loose clothing, neckties, watches, rings or other jewelry should not be worn around mechanical equipment. These items of apparel are considered dangerous on many jobs.

#### **12.11.5.1 Machine Installations**

1. Electrically powered machines will be grounded as prescribed within the National Electrical Code.
2. Machines must be placed so that the operator has room to safely perform operator duties and so that clearance is provided for aisle-ways and other equipment.
3. Machines installed on a bench, table or stand must be secured to prevent accidental movement.
4. A stationary piece of equipment must be anchored or provided with anti-slip pads.

#### **12.11.5.2 Machine Controls**

1. All electrically powered machines must have an on/off switch.
2. When unexpected motion could cause injury to personnel, an actuating control must be guarded (i.e., shroud) to prevent accidental activation.
3. Controls must be labeled as to their intended function.
4. When unexpected motion could cause injury, precautions must be taken to ensure that the machine does not automatically re-start upon the restoration of power.
5. In instances where machine controls are located in a remote location from the operator, an emergency stop device must be installed.
6. Equipment, which is operated in series, must have an inter-lock to all appropriate pieces of up-stream equipment. Re-activation of the equipment series must require a separate positive action by the employee who initiated the stop.

#### **12.11.5.3 Guards for Power Transmission**

Apparatus, which are referenced herein, include but are not limited to flywheels, cranks and connecting rods, revolving or reciprocating parts, shafts,

pulley guards and guides, belts, gears, sprockets and counterweights, friction drives, and associated components.

1. Any hazardous component, which is lower than seven feet from floor-height, must be guarded by a standard barricade, point of operation guard, or equivalent means of safeguarding.
2. Guards must be constructed to fit the application, made of material, which has the strength and rigidity to protect the exposure of power transmission parts and allow normal maintenance when practical.
3. If it becomes necessary to remove a guard for any purpose, the equipment in question must be locked out or otherwise rendered non-operable.

#### **12.11.5.4 Guard Design and Construction**

1. A guard shall be constructed to protect moving parts and other hazards without creating additional hazards.
2. The design of the guard will incorporate features to facilitate maintenance and lubrication requirements (i.e., hinged section).
3. A guard may be constructed of a wide variety of materials; however, it is very common to use sheet metal or expanded metal in a metal frame.

#### **12.11.6 TRAINING**

Employees need to be instructed in the care, use, operation and hazards associated with machine guarding and hazards associated with machinery in general use. Training should consist of information contained within this work practice requirement and other information related to the type of equipment and its use within a specific work assignment. Instruction can be on-the-job or classroom or a combination of both. The supervisor must retain training documentation.

#### **12.11.7 REFERENCES**

*For additional information regarding machine safeguards refer to MIOSHA, General Industry Standards, Part 1 "General Provisions" and Part 7 "Guards for Power Transmission".*

## **12.12 METALWORKING MACHINERY**

### **12.12.1 PURPOSE**

The requirements stated within this work practice provide DMB employees with a basis for safe set-up, operation, and maintenance of metalworking machinery and associated equipment.

### **12.12.2 SCOPE**

This standard applies to work assignments wherever a hazard may exist with the use of metalworking machinery such as drill presses, band saws, cut-off saws, sheers/punches, and lathes. It should be noted that portable power tools are specifically addressed within this manual under *Section 12.9 Hand and Portable Power Tools*. It is the responsibility of the supervisor to ensure that the information and work practices contained herein are effectively communicated and followed.

### **12.12.3 DEFINITIONS**

Barrier means protection for an operator from a hazard point on machinery and equipment.

Circular Metal Saw means a machine with support for the material and with a circular blade that is used for cutting metal.

Fixed Barrier means a type of guard, attached by fasteners that cannot be readily removed, that keeps the operator from the point of operation.

Interlocked Barrier means a type of guard with a control to interlock with a machine circuit that will stop the machine if the barrier is removed or opened.

Lockout means to secure by use of a lock.

Metal Band Saw means a machine that is equipped with two wheels on which a continuous blade is used for metal cutting purposes.

Operator means an employee who controls the machine or operation.

Operator's Position means that location where an operator controls a machine or operation.

Pinch Point means a point at where it is possible to be caught between the moving parts of a machine and the material in process or between moving and stationary parts of the machine.

Point of Operation Device means a control or attachment which:

- Restrains the operator from inadvertently reaching into the point of operation.
- Prevents normal machine operation if the operator's hands are inadvertently within the point of operation.

- Automatically withdraws the operator's hands if they are within the point of operation as the machine cycles.

Presence Sensing Device means a device designed, constructed and arranged to create a sensing field or area and to deactivate the point of operation when an operator's hand or other part is within such field or area.

## **12.12.4 RESPONSIBILITIES**

### **12.12.4.1 Management**

- Provide training to each employee, informing them of the potential hazards and safe operations of metalworking machinery.
- Ensure that metalworking machinery is properly maintained.
- Establish and maintain a Lockout/Tagout procedure, as prescribed in the Control of Hazardous Energy section in this manual
- Provide and enforce the use of recommended personal protective equipment (PPE).

### **12.12.4.2 Employee**

- Only use machinery and equipment authorized and trained to use.
- Report defective machinery and equipment and hazardous conditions, when detected to supervisor.
- Do not remove guards from machinery unless necessary for servicing or repair.
- Replace guards after proper servicing.
- Wear proper clothing (no loose clothing, neckwear or exposed jewelry, such as necklaces and rings).

## **12.12.5 REQUIREMENTS**

1. Appropriate PPE must be provided and used by all employees.
2. In areas where metalworking operations are performed, the aisles must be accessible and properly marked (no less than 4 ft. wide).
3. Metalworking equipment shall be installed so that the operator's position is not in an aisle.
4. Workstations, aisle, floors and platforms must be maintained free of slip/trip/fall hazards.

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5. Non-portable metalworking machinery must be secured to the floor by either non-slip pads or permanently anchored.
6. All electrically powered machinery and equipment must be grounded.
7. Provisions must be set to prevent the hazard of automatic activation of equipment upon power interruption or restoration.
8. Presence-sensing devices must incorporate a fail-safe device.
9. Controls must be designed, installed and/or guarded to prevent unintentional activation.
10. All machinery must be equipped with a stop device (kill switch) within reach of the operator.
11. Lockout/Tagout must be performed upon any repair, maintenance, or servicing where required.
12. Hydraulic or pneumatic system lines must be protected from chafing.
13. When hydraulic, air, or steam lines are bled, the devices supported by these systems must be physically blocked or secured to protect employees working around the equipment as required in the Control of Hazardous Energy Program Section of this manual.
14. Employees must be protected from chips, dust, sludge, and coolant splashes.
15. In the use of hand held nozzles, air pressure must be less than 30 psi under static flow conditions.
16. Magnets and vacuum chucks must be interlocked, to prevent contact between stock and the tool.
17. Equipment guarding must be capable of retaining flying stock.

### **12.12.6 TRAINING**

Operators of metalworking machinery and equipment must be trained in the methods of safe operations. The employees must be instructed in the safeguards and hazards associated with operation of the machinery, along with the purpose and procedures of Lockout/Tagout. Instruction can be on-the-job or classroom or a combination of both. The supervisor must retain employee training documentation.

### **12.12.7 REFERENCES**

*For additional information regarding metalworking machinery, components and equipment, refer to MIOSHA, General Industry Safety Standard Part 26 “Metal Working Machinery” Rules 408.12631-12650 and Section 12.12 “Metalworking Machinery” in this manual.*

## **12.13 MOTOR VEHICLE SAFETY**

### **12.13.1 PURPOSE**

The following information relates to common practices in the avoidance of vehicular accidents and personal injury. The ability to drive State of Michigan vehicles is integral to the performance of a wide range of activities routinely performed. The safe practices described herein effect passenger cars, pick-up trucks, vans commonly used for transporting people and small deliveries.

### **12.13.2 SCOPE**

The following information should be communicated to employees who are involved in using state vehicles to transport personnel or material between locations. It is management's responsibility to ensure that all DMB employees who are expected to drive state vehicles have a valid Michigan driver's license.

Under no circumstances should a DMB employee be allowed to drive a state vehicle should they lose or have a suspended driver's license. For vehicles used in commerce with a gross vehicle weight rating of more than 26,001 pounds, towing a trailer weighing more than 10,000 pounds, or a vehicle designed to transport 16 or more passengers including the driver, *see Section 10.6 Federal Motor Carrier Safety Program*. Federal Motor Carrier Regulations may evoke Commercial Drivers License (CDL) requirements.

### **12.13.3 DEFINITIONS**

Alcohol or Alcoholic Beverage means

- Beer as defined in 26 U.S.C. 5052(a), of the Internal Revenue Code of 1954
- Wine of not less than one-half of one per cent of alcohol by volume
- Distilled spirits as defined in section 5002(a)(8), of such code

Alcohol Concentration (AC) means the concentration of alcohol in a person's blood or breath. When expressed as a percentage it means grams of alcohol per 100 millimeters of blood or grams of alcohol per 210 liters of breath.

Endorsement means an authorization to an individual's CDL permitting the individual to operate certain types of commercial motor vehicles.

Motor vehicle means a vehicle, machine, tractor, trailer, or semitrailer propelled or drawn by mechanical power used on highways, except that such terms does not include a vehicle, machine, tractor, trailer, or semi-trailer operated exclusively on rail.

Serious Traffic Violation means conviction, when operating a commercial motor vehicle, of

1. Excessive speeding, involving any single offense for any speed 15 mph or more above the posted speed limit.

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2. Reckless driving, as defined by State or local law or regulation, including but not limited to, offenses of driving a commercial motor vehicle in willful or wanton disregard for the safety of persons or property.
3. Improper or erratic traffic lane changes.
4. Following the vehicle ahead too closely.
5. A violation, arising in connection with a fatal accident, of a State or local law relating to motor vehicle traffic control (other than parking violation). Serious traffic violations exclude weight and vehicle defect violations.

### **12.13.4 RESPONSIBILITIES**

#### **12.13.4.1 Management**

- To provide employees with information on the safe operation of motor vehicles.
- Inform employees on how to inspect and maintain DMB vehicles.
- Maintain motor vehicle equipment and make sure equipment remains in safe operating condition.

#### **12.13.4.2 Employee**

- Understand the requirements relating to the safe operation of DMB motor vehicles.
- Maintain a valid driver's license to safely operate a motor vehicle.
- Inspect motor vehicles before operating and report any defects or hazards associated with motor vehicle to supervisor or appropriate personnel.
- Accept responsibility for safe operation of State vehicles.

### **12.13.5 REQUIREMENTS**

#### **12.13.5.1 General Requirements**

1. Employees need to become familiar with their assigned State vehicle before driving. This includes the physical characteristics, dynamics, and capabilities.
2. Conduct a daily inspection of the vehicle to assure tires are inflated, that there are no leaking fluids, and essential equipment is functioning; horns, lights, blinkers, etc.
3. All employees are required to use seat belts and shoulder harnesses whenever operating a state owned vehicle.
4. Defensive driving techniques must be practiced at all times, but even more so at night or in inclement weather. Safe drivers follow these rules:



- a. Understand and operate vehicle within the speed limit rules.
- b. Operate the vehicle within your knowledge of the vehicle, and what your abilities will allow you to do in an emergency situation.
- c. Do not tailgate. Follow a four-second following distance rule (six-seconds on snow and ice).
- d. Use smooth acceleration, braking, and steering techniques at all times, especially in inclement weather and poor visibility conditions.
- e. Stay clear of other drivers operating their vehicles in an erratic manner.
- f. Communicate to others your intent to execute any maneuver in traffic.
- g. Cooperate with all drivers and other parts of the traffic environment such as pedestrians, bicyclists, other vehicles and animals.
- h. Be courteous to others at all times. React calmly to acts of belligerence on the part of other drivers.
- i. Do not exhibit acts of road rage toward others, and do not retaliate for these acts from other motorists.
- j. Understand the vehicle's "modern technology", e.g. front wheel versus rear wheel drive, or 4 wheel versus all wheel drive, anti-lock brakes, and airbags.

#### **12.13.5.2 DMB State Vehicle Emergency**

1. In case of a vehicle emergency, telephone 1-800-937-8149 and select the service you need for emergency service.
2. If you are within 45 miles of Lansing the vehicle may be brought to the Lansing Service Center (Secondary Complex.) Another alternative is the Detroit Service Center, or one of the service suppliers listed in your Maintenance Assistance Program (MAP) guide, found in the vehicle's glove box.

#### **12.13.5.3 Maintenance Assistance Program (MAP)**

The MAP Assistance Guide is a plastic coated document that contains several pieces of information:

1. The preventive maintenance schedule for the vehicle – including VIN number, wheels vehicle number and license plate number.
2. Steps to obtaining scheduled maintenance.
3. Steps to obtaining unscheduled maintenance.
4. The toll free number to locate a service supplier or emergency service (800-937-8149).

#### **12.13.5.4 State Vehicle Accident Procedure**

1. Obtain emergency help as needed at the scene.

2. Record name, address, and insurance information including policy number of all other parties involved on the Vehicle Damage Report located in the glove box.
3. Call (800) 937-8149 and provide the information you recorded to the collision center.
4. File a report with local police if the police do not complete an on-scene investigation/report.
5. The collision center will arrange for towing and alternate transportation when necessary and authorize repairs to the vehicle.
6. Obtain a copy of the police report and forward it to the collision center (mailing address and fax number are on the Vehicle Damage Report.)

#### **12.13.5.5 Battery Charging**

It is important to remember that batteries produce hydrogen gas, which can be explosive. Battery acid can also injure eyes and unprotected skin. When jumping a car battery it is important to ensure that vent caps are tight and level. The following procedure represents a best practice for the jumping of a car battery.

1. Clamp the first positive battery cable terminal (red) to the positive (+) battery post of the dead battery. Do not allow the cable clamp to touch metal other than the battery terminal.
2. Connect the other end of the positive battery cable (red) to the positive battery post (+) of the good battery.
3. Connect the negative cable to the negative battery post (-) of the good battery.
4. Make the final connection of the negative cable (black) to the engine block of the car with the dead battery. Do not make this connection near the carburetor, battery, fuel line or moving parts.
5. Stand back from both vehicles and start the car with the good battery. Attempt to start the disabled car. If the motor does not turn over, wait several minutes and try again. This is very common in cold weather.
6. Remove the cables in reverse order by first removing the cable from the engine block.

#### **12.13.6 TRAINING**

Employees need to be instructed in the care, use, operation and hazards associated with the operation of motor vehicles and related equipment if their work involves driving. Training should consist of information contained within this work practice requirement and other information related to the specific type of equipment.

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Instruction can be on-the-job or classroom or a combination of both. The supervisor will retain employee training documentation.

**12.13.7 REFERENCES**

*For additional information regarding specific requirements on Motor vehicle safety refer to the "Federal Motor Carrier Vehicle Safety Act of 1986".*

## **12.14 OFFICE SAFETY**

### **12.14.1 PURPOSE**

The following information relates to common practices in the avoidance of injuries within an office environment. These work practices provide prevention techniques to avoid slip, trip, falls, and cuts, and suggested guidelines for working safely in an office.

### **12.14.2 SCOPE**

The following information should be communicated to employees who work in an office setting. It is the supervisor's responsibility to communicate these practices, provide a safe working environment, and encourage employees to work safely.

### **12.14.3 DEFINITIONS**

Aisle means a path of travel for vehicles and employees.

Cumulative Trauma Disorder can occur when the body is frequently forced to maintain awkward or unnatural positions, engage in tasks that involve repetition, excessive force, vibration, or work in cold temperatures. The body can suffer wear and tear on those body parts affected and eventually break down. Over a period of months or years, this overuse can lead to Cumulative Trauma Disorders (CTDs), or Musculo-Skeletal Disorders (MSD).

CTDs can affect many parts of the body, however the most common are those which occur in the neck, back, shoulder, elbow and wrist. CTDs are injuries, which result in damage to muscles and tendons, and may result in soreness, swelling, numbness, and tingling, which can lead to permanent nerve damage.

Hazard Communication means the formal process used to ensure that the hazards associated with chemicals used on site are communicated to employees and management. Information concerning health hazards will be communicated by the use of container labeling, material safety data sheets and training. This information will also be used to evaluate and develop appropriate protective measures to safeguard employee health.

Material Safety Data Sheet (MSDS) are information sheets, on hazardous chemicals that provide details on how to safely use the chemical, how to store the chemical and any health or physical characteristics about the chemical.

Personal Protective Equipment (PPE) means specialized clothing or equipment that is worn by an employee to protect him or her from a hazard. General work clothes, such as uniforms, pants, shirts, or blouses, that are not intended to function as protection against a hazard are not considered to be personal protective equipment.

Video Display Terminal (VDT) means the device, which projects the computer image (also called a monitor or screen).

Walkway means a path of travel for foot traffic only.

#### **12.14.4 RESPONSIBILITIES**

##### **12.14.4.1 Management**

- Assure accidents are reported to Human Resources office.
- Assess office environment for any hazards or hazardous conditions that may cause an injury to an employee.
- Provide a safety orientation to newly hired employees, to include procedures for the safe use of equipment in the office, emergency procedures and the communication of hazard information.
- Provide PPE that may be recommended for specific activities (changing toner in copy or fax machines.)

##### **12.14.4.2 Employee**

- Utilize PPE for specific job tasks (gloves, apron etc.)
- Report any hazard such as: (defective or damaged equipment, slip/trip/fall hazards) to supervision.
- Maintain a clean and orderly work area.
- Report any injury/illness to supervision.

#### **12.14.5 REQUIREMENTS**

##### **12.14.5.1 Preventing Cuts and Punctures**

Follow these guidelines to help reduce the chance for cuts and punctures:

1. When sealing envelopes, use a liquid dispenser, not your tongue.
2. Safely store kitchen knives, scissors, staplers, letter openers, and box openers. Use with caution.
3. Avoid picking up broken glass with your bare hands. Wear gloves and use a broom and a dustpan.
4. Place used blades or broken glass in a rigid container, such as a box, before disposing in a wastebasket.

#### **12.14.5.2 Preventing Machine Accidents**

Only use machines that you know how to operate. Never attempt to operate an unfamiliar machine without reading the machine instructions or receiving directions from supervision. In addition, follow these guidelines to ensure machine safety:

1. Secure machines that tend to move during operation.
2. Do not place machines near the edge of a table or desk.
3. Ensure that machines with moving parts are guarded to prevent accidents. Do not remove these guards.
4. Unplug defective machines and report the problem to your supervisor immediately.
5. Do not use any machine that smokes, sparks, shocks, or appears defective in any way.
6. Close hand-operated paper cutters after each use and secure the blade guard.
7. Take care when working with copy machines. If you have to open the machine for maintenance, repair, or troubleshooting, remember that some parts may be hot. Always follow the manufacturer's instructions for troubleshooting.
8. Unplug paper shredders before conducting maintenance, repair, or troubleshooting or clearing paper jams.
9. Keep office equipment, facilities, and machines in good condition.

#### **12.14.5.3 Preventing Slips, Trips and Falls**

Many office accidents are caused by poor housekeeping practices. By keeping the office floor both neat and clean, slips, trips, and falls can be prevented.

1. Ensure that electrical cords and phone cords do not cross walkways or otherwise pose a tripping hazard. If you cannot move a cord, have a new outlet installed or secure the cord to the floor with cord covering strips. Do not tape cords down or run them underneath carpet.
2. Report or repair tripping hazards such as defective tiles, boards, or carpet immediately.
3. Clean spills and pick up fallen debris immediately. Even a loose pencil or paper clip could cause a serious falling injury.

4. Store items in an approved storage space. Take care to not stack boxes too high or too tight. Ensure that boxes are clearly labeled with their contents.
5. Arrange office furnishings in a manner that provides unobstructed areas of movement.
6. Keep stairs, steps, flooring, and carpeting well maintained.
7. Ensure that glass doors have some type of marking to keep people from walking through them.
8. Clearly mark any difference in floor level that could cause an accident.
9. Secure throw rugs and mats to prevent slipping hazards.
10. Do not place wastebaskets or other objects in walkways.
11. Immediately clean up spills or provide warning signage for the area until the spill is removed.
12. Avoid running or rushing on stairways.

#### **12.14.5.4 Stress Relieving Exercises**

1. To reduce stress and prevent fatigue, it is important to stretch your arms, neck, and legs often (micro-breaks) if you do the same type of work for long periods of time.
2. Periodically rest your eyes by closing them or looking at something other than the work at hand.
3. For a quick pick-me-up, breathe deeply several times by inhaling through your nose and exhaling through your mouth.
4. In addition, always try to eat your lunch somewhere other than your desk.

Other examples of stress-relieving exercises that can be done at your desk include the following:

1. Head and Neck Stretch: Slowly turn your head to the left and hold it for three seconds. Slowly turn your head to the right and hold it for three seconds. Drop your chin gently towards your chest, and then tilt it back as far as you can. Repeat these steps five to ten times.
2. Shoulder Roll: Roll your shoulders forward and then backward using a circular motion
3. Upper Back Stretch: Grasp one arm below the elbow and pull gently towards the other shoulder. Hold this position for five seconds and then repeat with the other arm.

4. Wrist Wave: With your arms extended in front of you, raise and lower your hands several times.
5. Finger Stretch: Make fists with your hands and hold tight for one second, then spread your fingers wide for five seconds.

#### **12.14.5.5 Step Ladders & Stools**

Always use an approved ladder or stool to reach any item above your extended arm height. Never use a makeshift device, such as a desktop, file cabinet, bookshelf, or box, as a substitute for a ladder or step stool.

Follow these guidelines when using ladders:

1. Do not load a ladder above its intended weight capacity.
2. Place ladders on slip-free surfaces even if they have slip-resistant feet. Secure the ladder if a slip-free surface is not available.
3. Avoid placing ladders in walkways. Secure a ladder if its location could cause an accident.
4. Keep areas around ladders clean and free of debris.
5. Do not use a ladder in front of a door. Secure the door so no one can open it.
6. Use appropriate step stool or ladder for reaching materials overhead.
7. Do not use the top two rungs of a ladder.

#### **12.14.5.6 Lifting - Rules of Proper Body Mechanics**

1. Test the load. Before lifting an object, estimate how much it weighs to make sure it can be safely moved. Use a dolly or other assistive device whenever feasible.
2. Plan the move. Determine how far you have to carry the load and be sure the path of travel is clear.
3. Use a wide, balanced stance with one foot ahead of the other. This reduces the likelihood of slipping and jerking movements.
4. Keep the lower back in its normal arched position while lifting. Bend at the knees or hips. With the back arched, the forces are more evenly distributed on the support structures.
5. Bring the load as close to the body as possible. This keeps the back from acting as a fulcrum and reduces stress.
6. Keep the head and shoulders up as the lifting motion begins. This helps maintain the arch in the lower back.
7. Tighten the stomach muscles as the lift begins. This causes the abdominal cavity to become a weight bearing structure.
8. Lift with the legs and stand up in a smooth, even motion.



9. Move the feet (pivot) if a direction change is necessary. This eliminates the need to twist at the waist; reducing the stress on the supporting structures of the back.
10. Communicate clearly if two or more individuals are involved in the lift. This reduces the likelihood of an error, which could result in sudden or jerking movements.

#### **12.14.5.7 Fire Prevention and Electrical Safety**

Fires can result from:

1. Overheated equipment
2. Overloaded conductors
3. Short circuits
4. Damaged electrical cords

Follow these fire prevention and electrical safety guidelines:

1. Practice good office housekeeping. Trash should always be placed in appropriate containers and emptied regularly. Maintain aisles and walkways clear of debris and equipment.
2. Follow the No Smoking policy for state facilities. Smoking is prohibited inside all state buildings. Employees may smoke outside approximately 25 feet from the building.
3. Report faulty electrical equipment and discontinue its use until the device can be repaired or replaced.
4. Do not overload electrical circuits. Check with the Facility Manager if there are any questions regarding what might overload a circuit.
5. Inform employees of emergency evacuation procedures (See Section 10.4)
6. Use only UL approved power strips.
7. Never remove the grounding post from a three-prong plug to make it fit into a two-plug wall socket.
8. When unplugging a cord, pull on the plug head, not on the cord.
9. Keep anything that will burn away from light bulbs or other electrical appliances.

#### **12.14.5.8 Chemical Storage**

1. All workplace chemicals must be labeled. This would include toners for copier, fax and printers.
2. Material Safety Data Sheets (MSDS) will be obtained and maintained for employees to review.
3. Flammables and other hazardous materials are stored properly.
4. Isolate machines that generate fumes or heat.

#### **12.14.5.9 Work Station Arrangement**

With the extensive use of computers and other automated desk devices in the workplace, employees must take special care to ensure proper workstation arrangement and proper body mechanics. A workstation consists of the equipment and furniture associated with a typical desk job (i.e., desk, chair, and computer components).

#### **12.14.5.10 File Cabinets and Shelves**

Follow these safety guidelines for file cabinets:

1. Secure file cabinets that are not weighted at the bottom. Either bolt them to the floor or to the wall.
2. Ensure that file cabinet drawers cannot easily be pulled clear of the cabinet.
3. Do not block ventilation grates with file cabinets.
4. Open one drawer at a time. Close drawers when they are not in use.
5. Do not place heavy objects on top of cabinets. Be aware that anything on top of a cabinet may fall off if a drawer is opened suddenly.
6. Never climb on shelves (even lower shelves). Use an approved ladder or step stool.

#### **12.14.5.11 Desks**

Follow these safety guidelines for office desks:

1. Keep desks in good condition (i.e., free from sharp edges, nails, etc.)
2. Ensure that desks do not block exits or passageways.
3. Ensure that glass-top desks do not have sharp edges.
4. Ensure that desks with spring-loaded tables function properly. The table should not spring forth with enough force to cause injury.
5. Do not climb on desks.
6. Keep desk drawers closed when not in use.
7. Repair or report any desk damage that could be hazardous.

#### **12.14.5.12 Chairs**

Safety guidelines for office chairs include the following:

1. Do not climb or stand on an office chair. Use an approved ladder or step stool.
2. Office desk chairs should have adjustable back supports and seat height. Make sure that your chair's back support position and seat height are comfortable.
3. Take care when sitting in a chair with rollers. Make sure it does not roll out from under you when you sit down, and do not lean too far back.
4. Repair or report any chair damage that is not functioning properly.
5. Do not roll chairs over electrical cords.

#### **12.14.5.13 Seating Position – Shifting to Neutral**

Working in awkward positions increases the chance of injuring muscles, tendons, nerves, or joints. Follow these seating guidelines when working with computers or typewriters:

1. Try to maintain neutral body positions.
2. Make sure your chair is adjusted to provide adequate support to your lower back.
3. Place your feet flat on the floor or on a footrest. Lower legs should be approximately vertical, and thighs should be approximately horizontal. The majority of your weight should be on the buttocks.
4. Ensure that there is at least two to four inches of clearance between the top of your thighs and the bottom of the desk or table.
5. Keep your wrists in a neutral (straight) position. They should not rest on the edge of the desk.
6. Keep the front edge of your chair approximately two to four inches behind your knees.
7. Keep shoulders relaxed, neck straight and elbows close to body.
8. Periodically relax arms, letting them hang by the sides of body.

#### **12.14.5.14 Equipment Arrangement**

By properly arranging your equipment, you can also help reduce the harmful effects of cumulative trauma. Follow these guidelines for arranging office equipment:

##### **12.14.5.14.1 Lighting**

Lighting around the computer workstations should illuminate the work area without obscuring the VDT or causing glare. Position computer screens, draperies, blinds, and pictures to reduce glare during work hours (e.g., place the VDT screen at a right angle to the window).

##### **12.14.5.14.2 VDT Screen**

VDT images should be clear and well defined. Adjust the screen's brightness, contrast, and display size to meet your needs. If a screen flickers or jumps, have it repaired or replaced.

Place the VDT 18-28 inches away from your face. The center of the VDT should be approximately 15-25 degrees below your line of vision.

##### **12.14.5.14.3 Keyboard & Mouse Supports**

Position computer keyboard so that the angle between the forearm and upper arm is between 80 and 120 degrees. Place the keyboard in an area that is accessible and comfortable.

Wrist supports positioned in front of the keyboard and the computer mouse may help reduce the occurrence of wrist/flexion/extension by keeping the wrists straight. The wrist support should be compressible or soft, but not so soft that it increases the force on the wrists. Supports should not restrict postures or be overused.

##### **12.14.5.14.4 Document Holders**

A document holder positioned at approximately the same height and distance from your face as the VDT screen, will help avoid frequent eye and head movement, decreasing forward flexion of the head and neck.

##### **12.14.5.14.5 Telephones**

Neck tension is a common problem caused by holding the telephone between the head and neck. Use a headset or speakerphone if you use the telephone for extended periods of time, or consciously become aware of maintaining a neutral head position while holding the handset.

#### **12.14.6 TRAINING**

Employees need to be instructed in the care, use, operation and hazards associated with general office equipment. Instruction on procedures and general office safety should be provided to all employees by supervision. Training should consist of information contained within this work practice, and other information related to specific tasks in the office. Instruction can be on-the-job or in the classroom or a combination of both.

#### **12.14.7 REFERENCES**

*At the present time there is no regulatory basis for the requirements stated within this standard, however, it is anticipated that the Federal proposed "Ergonomics Standard" will encompass many of these requirements.*

## **12.15 POWERED GROUNDSKEEPING EQUIPMENT**

### **12.15.1 PURPOSE**

The following requirements ensure the safe maintenance, use, and operation of powered grounds-keeping equipment. Such equipment includes but is not limited to lawn mowers, snow blowers, tractors, tillers, edgers and associated equipment. The requirements stated within this work practice are established to prevent injury to employees required to operate powered grounds-keeping equipment.

### **12.15.2 SCOPE**

These work practices apply to any DMB employee with a job that consists of working with or around powered groundskeeping equipment. It is the supervisor's responsibility to ensure that the information and work practices contained herein are effectively communicated and followed. Only trained employees will operate and maintain powered grounds-keeping equipment. Personal protective equipment such as safety glasses, foot protection and hearing protection will be worn when operating equipment to protect the operator from hazards associated with discharge shoots, flying debris and similar hazards.

### **12.15.3 DEFINITIONS**

Attachment means detachable equipment, such as, but not limited to, a mower, snow thrower, tiller or sweeper designed for use with a propulsion vehicle.

Blade Enclosure means the guard around the periphery of the rotary mower blade.

Discharge Guide means the device which directs the snow from the impeller to the deposit area, and which is rotatable to deliver the snow in the desired direction.

Edger-Trimmer means a walk behind powered machine with a rotary blade designed to edge grass in a vertical position and trim grass when adjusted to a horizontal position.

Foot Protection means footwear such as, but not limited to, safety shoes or strap-on foot guards.

Grass Catcher means a part or a combination of parts that provides a means for collecting grass clippings and other debris.

Groundskeeping Equipment means that equipment such as, but not limited to, lawn mowers, lawn and garden tractors, leaf blowers, snow throwers, shredders, compost mills and tillers used to maintain lawns, gardens, walks and drives.

Impeller means a final power driven device that imparts energy to discharge the snow.

Riding Lawn Tractor means a self-propelled riding vehicle designed for general-purpose lawn work with the use of separate attachments.

Riding Mower means a self-propelled riding vehicle designed specifically for cutting grass.

Rotary Tiller means a powered machine with steel tines attached to a horizontal shaft, which revolves to till soil.

Single Stage Snow Thrower means a snow thrower, which incorporates the impeller into the collector, either at the end of the collector or in the middle.

Snow Thrower means a machine designed to move snow from 1 area to another.

Two Stage Snow Thrower means a snow thrower with the impeller as a separate unit from the collector.

Walk Behind Mower means a grass cutting machine, which is either pushed or self-propelled, controlled by an operator walking behind the unit.

#### **12.15.4 RESPONSIBILITIES**

##### **12.15.4.1 Management**

- Instruct employees in the safe operation of powered groundskeeping equipment, required safeguards, and associated hazards.
- Train employees on how to inspect, mount, and maintain powered groundskeeping equipment.
- Maintain equipment (assure equipment is operated with specific guards).
- Maintain equipment in a condition, which will not create a hazard for employees.
- Provide personal protective equipment where needed.

##### **12.15.4.2 Employee**

- Understand the requirements relating to the safe operation of powered groundskeeping equipment assigned.
- Inspect equipment for damage and report any defects or hazards to supervisor.
- Wear required personal protective equipment.
- Follow all applicable safety regulations listed in this part.

## **12.15.5 REQUIREMENTS**

### **12.15.5.1 *Pre-Use Precautions***

1. Pick up any rocks, glass, tree branches, etc. that could become lethal missiles if thrown by the mower's blades. Wear approved safety glasses.
2. Make adjustments to wheel height before starting the mower.
3. Disconnect the spark plug's wire when cleaning, repairing or inspecting the mower.
4. Wear sturdy, rough soled, work shoes with steel toes.
5. Keep all guarding in place especially around the mower's blades, belts, pulleys, etc.
6. Keep hands and feet out from under the mower deck.
7. Do not defeat or disable the safety switches on the guards or the mower controls.
8. Do not repair, adjust or unclog the mower while it is running.
9. Do not refuel the mower while it is running.
10. Keep visitors at a safe distance while mower is running.

### **12.15.5.2 *Riding Mowers***

1. Operators should clear from the work area objects that might be picked up and thrown and identify fixed objects that might damage the mower.
2. Operators should disengage all attachment clutches and shift into neutral before attempting to start the engine.
3. Operators should disengage power to the attachments and stop the engine before making any repairs or adjustments, when transporting them, or when they are not in use.
4. When leaving the mower unattended, operators should disengage the power takeoff, lower the attachments, shift into neutral, set the parking brake, stop the engine, and remove the key from the ignition.
5. When mowing, operators should watch for holes in the lawn and for other hidden hazards.
6. When mowing on slopes operators should:
  - a. Not start or stop suddenly when going uphill or downhill.



- b. Avoid steep slopes.
  - c. Avoid mowing steep slopes when wet from rain or morning dew.  
Large mowers are known to turn over backwards as a result of the extreme power in the rear wheels.
  - d. Mow up and down the face of steep slopes rather than across.
  - e. Prevent tipping or loss of control on slopes or sharp turns, by reducing speed.
  - f. Be alert for traffic when crossing, or working near roadways. Do not back up without making certain it is safe to do so.
- 7. Operators should maintain the mower and its attachments in safe operating condition and keep safety devices in place. When using attachments, direct discharge of material away from anything that could be hurt or damaged by it.
  - 8. Tighten nuts, bolts, and screws, especially the blade-mounting bolts. If the mower or its attachments should strike a solid object, the operator should stop and inspect the mower for damage and repair it before restarting and operating the mower.
  - 9. Operators should not change the engine's governor settings or over speed the engine.

#### **12.15.5.3 Walk Behind Mowers**

- 1. When using a walk behind mower always cut across a steep slope (never cut up and down).
- 2. Disconnect electric mowers before attempting to service.
- 3. Adjust the speed of self-propelled mowers to a comfortable pace so that the operator is in control at all times.

#### **12.15.5.4 Snow Blowers**

- 1. When using a snow blower on a gravel surface, adjust the height to the highest position.
- 2. Inspect the area for debris or objects, which could be thrown by the impeller.
- 3. Disengage the clutch before adjusting the discharge shoot position.
- 4. Never attempt to clear the discharge shoot while the engine is running.
- 5. Adjust the speed of self-propelled blowers to a comfortable pace so that the operator is in control at all times.

#### **12.15.5.5 *Edge Trimmers***

1. Ensure that the cutting blade of an edge trimmer has a blade guard.
2. When adjusting the guard or cutting depth, the edger must be turned off.

#### **12.15.5.6 *Labels and Warnings***

1. All operating controls must be labeled.
2. Self-propelled equipment must have a control label indicating “Caution – Be sure the operating control is in neutral before starting the engine”.
3. A walk behind or riding mower shall have warning label near the discharge opening stating “Mower shall not be used unless the opening guard or grass catcher is in place”.
4. A riding mower shall have a label which states:
  - a. “Caution – Keep all guards in place”.
  - b. Before leaving unattended, disengage clutch/attachments and set parking brake.
  - c. Wait for movement to stop before servicing.
5. A snow thrower must have a label on the discharge opening stating “Warning – Keep hands out of discharge guide”.
6. A snow thrower must have a label on the housing stating “Warning – Keep hands and feet clear of collector when engine is operating”.
7. All warning labels must be legible.

#### **12.15.6 TRAINING**

Employees need to be instructed in the care, use, operation and hazards associated with abrasive wheels and related equipment before being assigned a job task by the supervisor. Instructions on the proper PPE to wear will be included. Training should consist of information contained within this work practice requirement and other information related to the type of equipment and its use within a specific work assignment. Instruction can be on-the-job or classroom or a combination of both. The supervisor must retain training documentation.

### **12.15.7 REFERENCES**

*For additional information regarding safety requirements on groundskeeping equipment refer to MIOSHA, General Industry Safety Standard Part 54 “Powered Groundskeeping Equipment”.*

## **12.16 REFUSE PACKER UNITS**

### **12.16.1 PURPOSE**

The requirements stated within this work practice are established to prevent injury to employees who are required to work with and around refuse packer units.

### **12.16.2 SCOPE**

This part applies to the safe design, use and maintenance of mobile and stationary equipment used in the collection and compaction of solid waste in, around or about DMB locations.

### **12.16.3 DEFINITIONS**

Container means a bin used for collection of refuse at a point of origin.

Hopper means a part of a refuse packer unit for receiving refuse.

Hydraulic Piping means flexible or rigid tubing used to transfer fluids under pressure.

Packer Blade or Panel means a metal plate, which moves the solid waste material from a hopper into a holding unit.

Pinch point means a point at which it is possible to be caught between moving parts of a machine or between moving and stationary parts of a machine.

Receiving Box means a receptacle that receives refuse from a stationary refuse unit.

Refuse means solid wastes and includes garbage, rubbish, grounds debris, street cleanings and related material. Specifically excluded from this definition are any liquid or solid waste regulated by Department of Environmental Quality (DEQ) or federal statute.

Safety Factor means the ratio of the breaking strength of a piece of material or object to the maximum designed load or stress applied when in use.

Stationary Refuse Packer Unit means a unit, which remains at one location and receives solid waste material and compacts it under pressure.

### **12.16.4 RESPONSIBILITIES**

#### **12.16.4.1 Management**

- DMB will provide instruction and training before assigning an employee to a refuse packer unit.
- Use a refuse packer unit within its maximum rated capacity.

- Maintain a refuse packer unit within its rated capacity.
- Establish and maintain a lockout procedure.

#### **12.16.4.2 Employees**

- Use guards and other safety features provided on a refuse packer unit.
- Use personal protective devices provided by the employer.
- Use a refuse packer unit only after being instructed and trained in its safe operation.
- Use a refuse packer unit within the maximum rated capacity of the equipment.
- Report damage to or failure of a refuse packer unit.
- Assure all employees remain clear of the rear of the unit before ejecting or dumping a loaded refuse packer unit.

### **12.16.5 REQUIREMENTS**

#### **12.16.5.1 Operation of Refuse Packer Units**

1. Employees shall not pass or work under any elevated equipment or part thereof, except when protected by a truck cab or when the elevated part is supported by a prop extending to the vehicle capable of supporting the sustained load.
2. An operator of a refuse packer unit shall not eject or dump a loaded unit until all employees are clear of the rear of the unit.
3. A lockout procedure shall be implemented during repairs except when power is necessary during troubleshooting or testing. The power shall be shut off and the key removed before and during repairs to the packer or compaction mechanism.

#### **12.16.5.2 Hoisting Cables and Chains**

Hoisting cables shall be inspected for defects monthly.

#### **12.16.5.3 Hydraulic Piping**

1. A refuse packer unit shall not be used when a hydraulic system is leaking in excess of normal seepage due to the potential malfunction of equipment or hazard to employee.

2. Leaking hydraulic fluid can cause burns, therefore employees are required to report any leaking of hydraulic fluids and shall be protected from contact.

#### **12.16.5.4 Lighting**

It is important that employees have proper illumination during hours of darkness. It is required that at least 5 foot-candles of illumination be provided at the loading or hook up point.

#### **12.16.5.5 Mobile Units**

Employees using rider steps shall use grab handles provided for their safety. When loading mechanically, employees shall use the locking device to prevent dislodgment of a container during the dumping operation.

#### **12.16.5.6 Stationary Units**

1. When the operator is not protected from the moving ram by barrier guarding and direct manual loading is used, the control shall require continuous pressure and the compactor cycle shall stop when the control is released. If the operator finds the unit will operate without the required continuous pressure it must be reported.
2. Emergency stop devices will be provided at the control stations to stop the ram of a stationary refuse packer unit.

### **12.16.6 TRAINING**

Employees need to be instructed in the care, use, operation and hazards associated with refuse packer units and related equipment before being assigned a job task by the employer. Training should consist of information contained within this work practice requirement and other information related to the type of equipment and its use within a specific work assignment. Instruction can be on-the-job or classroom or a combination of both. The supervisor must retain training documentation.

### **12.16.7 REFERENCES**

*For additional information regarding for inspection requirements refer to MIOSHA,  
General Industry Standard Part 17 rule 1716 “Refuse Packer Units”*

## **12.17 SCAFFOLDS**

### **12.17.1 PURPOSE**

The following requirements are established to prevent employee injuries by establishing a basis for the care, set-up, use and maintenance of scaffolds and associated devices in DMB maintained properties. Self-propelled vehicle mounted elevating platforms are excluded from the requirements stated herein.

### **12.17.2 SCOPE**

These work practices apply only to employees who are authorized to erect, use and maintain scaffolds. It is suggested that management review the application and selection of scaffolding systems in relation to specific tasks. The following information must be reviewed as a component of the employee training program in addition to the manufacturers' recommended operating and maintenance requirements.

The types of scaffold in common use include suspension scaffolds, swinging scaffolding, outrigger's scaffolds, horse scaffolds, ladder jack scaffolds, tube and coupler type scaffolds, mobile scaffolds, wire rope scaffolds and welded frame scaffolds. Each of these types of scaffold has specific risks associated with their assembly and use. *Department of Consumer and Industry Safety Standards Part 5 Scaffolding should be referenced* in addition to manufacturers guidelines regarding the assembly and use of scaffolds. In addition the following general precautions should be considered:

### **12.17.3 DEFINITIONS**

Angulated Roping means a suspension method where the upper point of suspension is inboard from the attachments on the suspended unit, thus causing the suspended unit to bear against the face of the building.

Bearer (Putlog) means a bearing cross member that supports the floor of a scaffold.

Coupler means a device which is made of drop-forged steel, malleable iron, structural grade aluminum, or a material of equivalent strength and which is used to lock or join component parts of a tubular scaffold.

Heavy Duty Scaffold means a scaffold designed and constructed to carry a uniformly distributed load of 75 pounds per square foot.

Light Duty Scaffold means a scaffold designed and constructed to carry a uniformly distributed load of 25 pounds per square foot.

Nominal means dressed sizes of lumber.

Medium Duty Scaffold means a scaffold designed and constructed to carry a uniformly distributed load of 50 pounds per square foot.



Plank means a piece of lumber, as prescribed in this section, which is sold by a lumber dealer and which does not have stringers or cross braces when purchased.

Roof Bracket means a bracket which is used on a slope roof to support a plank and which can be fastened to the roof or secured by ropes over the ridge to a fixed object.

Scaffold means an elevated work platform, that is for supporting both employees and materials and which is temporary in nature.

Stability Factor means the ratio of the stabilizing moment to the overturning moment.

Stabilizer Tie means a flexible line that connects the building anchor and the suspension wire rope that supports the platform.

Working Load means the total weight of employees, materials, and equipment.

Working Platform means a suspended structure which is used for vertical travel and which either may be powered from a roof car or have its own raising and lowering powered mechanism.

## **12.17.4 RESPONSIBILITIES**

### **12.17.4.1 Management**

- Assure that defective scaffolding, which could create a hazard to an employee, will not be used.
- Perform and keep a record of regular inspections of scaffolding, supporting structures, and associated components/equipment.
- Provide personal fall arrest systems.
- Provide training and instruction to employees operating, erecting, disassembling, and maintenance of job specific scaffolding.
- Make employees aware of specific hazards and safeguards associated with scaffolding.
- Develop and ensure an emergency action plan.
- Keep a record of employee training and certification.

### **12.17.4.2 Employee**

- Utilize required PPE, including personal fall protection.
- Report any damaged or defective scaffolding or scaffolding components to supervisor.

- Never create a hazardous condition to employees below e.g.(falling equipment)
- Pre-use inspection of scaffolding and scaffolding components.
- General recognition and prevention of safety hazards associated with the use of working platforms.

## **12.17.5 REQUIREMENTS**

### **12.17.5.1 General Precautions**

1. There must be sufficient work area (typically at least three boards, four if bricks and mortar are carried).
2. In the case of free standing scaffolding there is a simple working rule for the proportion of height in relation to base. The maximum should be 4:1, which is the relationship of height to the smallest dimension of the base.
3. Access to the working stage should be by ladder, fixed if possible, inside the structure, which should have its verticals more than eight feet apart, in either direction.
4. Never overload a scaffold. Scaffolds and their components should be capable of supporting, without failure, four times the maximum intended load.
5. Scaffolds should be erected, moved, dismantled, or altered only under the supervision of a competent person.

### **12.17.5.2 Construction**

1. Toe boards and guardrails have to be provided at the open face and at the ends of any work platform if the working level is six or more feet above the floor level.
2. A safe and convenient access to all scaffolds must be provided.
3. Manufactured scaffolding shall be equipped with a stair or a fixed ladder or have access to:
  - a. Ladder
  - b. Hook-on or attachable metal ladders that are specifically designed for use in construction with manufactured types of scaffolds. If hook-on attachable ladders are used as access to, or egress from, a work platform that is more than 35 feet above the ground or floor level, then a safety device must be installed or the ladders must be offset with landing platforms and guardrails that are installed at no more than 35-foot intervals.
  - c. Step or hook-on, stair-type accessories that are specifically designed for use with appropriate types of scaffolds.

- d. An adjacent scaffold, the structure, or a personnel hoist.
- e. A ramp, runway, or stairway that conforms to construction safety standard on guarding of walking and working areas.

### **12.17.5.3 Fall Arrest Systems**

1. A guardrail must be installed on any open side or end of a scaffold 10 feet or more above the floor or ground, except for a boatswain's chair, float scaffold, ladder jack, and needle beam scaffold.
  - a. A top rail or an intermediate rail may be eliminated if the configuration of the scaffold and the material deck provides equivalent protection against an employee falling from the platform or if an approved fall arrest device is worn.
2. An approved fall arrest device must be worn when working more than six feet above the ground, floor, or water.
  - a. An approved fall arrest device must be worn by an employee on a work platform or a boatswain's chair, float scaffold, needle beam, swing stage, or single-point adjustable suspension scaffold which is greater than or equal to six feet above the floor or ground.
  - b. An approved fall arrest device must be worn and attached to a substantial portion of a scaffold when the work platform of a single point adjustable suspension scaffold with overhead protection is six or more feet above the floor, water, or ground. Separate safety lines must be attached to a substantial portion of the structure above and to scaffold by an approved fall arrest device in a manner to prevent the scaffold from falling more than 12 inches if the old suspension system fails

### **12.17.5.4 Scaffold Suspension**

1. Welding, burning, riveting, or open flame work must not be performed within 10 feet of fiber or synthetic rope that is used to suspend a scaffold, unless the rope is protected from sparks, flame, or hot metal. Only treated or protected fiber or synthetic ropes must be used for or near any work that involves the use of corrosive substances or chemicals.
2. Wire, synthetic, or fiber rope that is used for scaffold suspension must be capable of supporting not less than 6 times the maximum intended load.
3. Wire, fiber and synthetic ropes must be visually inspected, before the start of each daily use, for any external damage such as:
  - a. Wire rope being kinked, crushed, birdcaged, or any other damage that distorts the rope's structure.
  - b. Fiber rope having abrasions, cuts or broken fibers, decay, burns, mold, or color change in fibers, or any variation in size or roundness of the strands.
  - c. Synthetic rope having abrasions, cut or broken fibers, burnt or melted fibers, or any variation in size or roundness of the strands.

4. When wire rope is used to suspend an adjustable scaffold it must conform to both of the following:
  - a. Have the fixed-end equipped with a proper size thimble and attached to the upper support member.
  - b. Have the running rope securely attached to the hoisting drum and must have not less than 4 wraps of the rope remain on the drum at all times.
  - c. A hoisting machine must be inspected daily when in use and must not be put in service unless it is free of defects which would affect the operation of the machine.

#### **12.17.5.5 Hoisting Machines**

1. Powered hoisting machines.
  - a. Gears and brakes of a powered hoisting machine must be enclosed.
  - b. In addition to the operating brake, a machine must have an emergency brake, which engages automatically when the normal speed of descent is exceeded.
  - c. Operating controls must be of a dead-man type.
  - d. When a hydraulic or pneumatic system of a powered hoisting machine is bled, the platform supported by this system must be in the lowered position or blocked in such a manner that the safety of the employee is assured.
  - e. A leak in a hydraulic or pneumatic system must be repaired before the unit is used.
  - f. A reverse check valve or equivalent means must be installed in the hydraulic cylinder to prevent uncontrolled fall of the work platform in case of system failure.
2. Manually powered hoisting machines.
  - a. A manually powered hoisting device must be equipped with a positive locking device
  - b. A manually powered machine must be designed to prevent free spooling of the cable drum.

#### **12.17.5.6 General Safety Rules**

1. Excess tools, materials and debris must not be permitted to accumulate on a scaffold, which can create a hazard.
2. An employee must not be allowed to work on a scaffold outdoors during a storm or when the wind speed is more than 25 miles per hour, except when performing emergency service.
3. When performing emergency service required fall protection must be used by the employee.
4. A scaffold must be kept free of slippery conditions such as those caused by ice, snow, oil, grease or other slippery compounds.

5. An employee must not be allowed within 10 feet of uninstalled energized electrical lines.
6. Before a scaffold is erected within 10 feet of an electrical line, the utility or property owner must be consulted.

#### **12.17.6 TRAINING**

Employees need to be instructed in the care, use and operation and hazards associated with scaffolding before being assigned to a job task by the employer. Training should consist of information contained within this work practice requirement and other information related to the type of equipment and its use within a specific work assignment. Instruction can be on-the-job or classroom or a combination of both.

Suggested Topics Include:

1. Recognition and prevention of safety hazards associated with assigned work tasks.
2. Recognition of safety hazards associated with the scaffold related equipment.
3. Emergency action measures.
4. Personal fall protection requirements, system limitation, proper use, care, and maintenance of equipment.
5. The use of documented work procedures and manufacturer's information on equipment operation.

The supervisor must retain training documentation.

### **12.17.7 REFERENCES**

*For additional information regarding specific requirements on scaffolding refer to MIOSHA, General Industry Standard Part 5 “Scaffolds” and Construction Safety Standard Part 12 “Scaffolds”.*

*For additional information regarding where safety harnesses, lanyards, and lifelines are required by these rules for the protection of employees, such equipment must be as prescribed in MIOSHA Construction Safety Standard Part 6 “Personal Protective Equipment”, being R 408.40601 et seq. of the Michigan Administrative Code.*

## **12.18 SLIPS, TRIPS AND FALLS PREVENTION**

### **12.18.1 PURPOSE**

The requirements stated within this work practice are established to prevent injury to employees who are required to work on job assignments where there is exposure to slip, trip, and fall hazards.

### **12.18.2 SCOPE**

These work practices apply to any DMB employee with a job that consists of working in areas where slip, trip, and fall hazards may exist. This may include working outdoors or public areas where standing water could be encountered. It is the supervisor's responsibility to ensure that the information and work practices contained herein are effectively communicated.

### **12.18.3 DEFINITIONS**

Aisle means a path of travel for vehicles and employees

Handrail means a single member, which is supported on brackets from a wall or partition, as on a stairway or ramp, and which is provided to furnish persons with a handhold.

Standard Barrier means a barrier erected along exposed edges of a floor opening, wall opening, ramp, platform or runway to prevent falls of persons or materials.

Walking or Working Surface means the floor that an employee walks, climbs, stands on, or otherwise uses in his or her place of employment.

### **12.18.4 RESPONSIBILITIES**

#### **12.18.4.1 Management**

- Instruct the employee in the safe operation of specific job assignments in an effort to avoid hazards involving slips, trips or falls.
- Assure employees wear appropriate footwear.
- Assure proper housekeeping is enforced to lessen exposure to slips, trips, and falls.
- Ensure that warning signage is posted in public areas where standing water may create a slip hazard.

#### **12.18.4.2 Employee**

- Understand the requirements relating to exposures that may lead to a slip, trip or fall hazard.
- Practice good housekeeping and avoid exposure that could lead to a slip, trip or fall type injury.
- Wear appropriate footwear.

### **12.18.5 REQUIREMENTS**

#### **12.18.5.1 Preventing Slips: Indoor Surfaces**

1. Shorten stride to maintain center of balance.
2. Walk with feet pointed slightly outward, creating a stable base.
3. Make wide turns at corners.
4. Wear slip-resistant footwear appropriate for the job.
5. Use abrasive strips to increase traction.
6. Post signs to warn of wet areas.
7. Take responsibility to clean up spills or draw attention to the spill in some way so that others will avoid the area. Report the problem immediately for clean up.
8. Secure throw rugs to the floor or use rugs with a skid-resistant backing.

#### **12.18.5.2 Preventing Slips: Outdoor Surfaces**

1. Slow down to react to a change in traction.
2. Wear slip-resistant shoes or overshoes, and carry your work shoes.
3. Wear sunglasses when outdoors or in ice and snow to help you see possible hazards.
4. Walk with caution when shoes are wet and you are entering a dry floor area, such as indoors.

#### **12.18.5.3 Preventing Trips**

1. Use a designated pathway or aisleway instead of taking a short cut.
2. Replace burned out light bulbs immediately to maintain visibility.



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3. Keep walkways free of objects and clutter.
4. Keep file drawers closed.
5. Tape or tack down carpet that does not lie flat.
6. Cover cables that cross walkways.

### **12.18.5.4 Preventative Tips Include**

1. Know how to properly use tools and equipment.
2. Use ladders properly.
3. Use personal protective equipment when working from heights.
4. Maintain work area free from slip, trip, and fall hazards.
5. Provide adequate lighting.
6. Follow safe work procedures.
7. Utilize engineering controls such as guardrails, safety nets, scaffolds, and aerial platforms.

### **12.18.6 TRAINING**

Employees need to be instructed in the care and use of equipment and conditions involving exposure to slips, trips, and falls in various work areas. Training should consist of information contained within this work practice requirement and other information relating to exposure that could lead to slip, trip or fall-type injuries. Instructions can be on-the-job or classroom or a combination of both. The supervisor must retain training documentation.

### **12.18.7 REFERENCES**

*For additional information on requirements relating to floor & wall openings, standard barricades and related topics, refer to MIOSHA, General Industry Standard Part 2 "Floor and Wall Openings, Stairways and Skylights".*

## **12.19 SLINGS**

### **12.19.1 PURPOSE**

The purpose of this standard is to prevent employee injury in the use of slings and provide recommended practices for their application, care, and use.

### **12.19.2 SCOPE**

These established rules set forth the safe work practices and sling specifications. The following slings are covered in this section: chain, wire rope, metal mesh, three strand natural or synthetic rope, and synthetic web made from nylon, polyester, and polypropylene. It is the supervisor's responsibility to ensure that the information and work practices contained herein are effectively communicated and followed.

### **12.19.3 DEFINITIONS**

Angle of Loading means the inclination of a leg or branch of a sling, measured from the horizontal or vertical plane, provided that an angle of loading of 5 degrees or less from the vertical may be considered a vertical angle of loading.

Basket Hitch means a sling configuration whereby the sling is passed under the load and has both ends, end attachments, eyes, or handles on the hook or a single master link.

Braided Wire Rope means a wire rope formed by plating component wire ropes.

Choker Hitch means a sling configuration with one end of the sling passing under the load and through an end attachment, handle, or eye on the other end of the sling.

Coating means an elastomer, or other suitable material, applied to a sling or to a sling component to impart desirable properties.

Designated means to be selected or assigned by the employer or the employer's representative as being qualified to perform specific duties.

Hitch means a sling configuration whereby the sling is fastened to an object or load, either directly to it or around it.

Proof Load means a load applied in performance of a proof test.

Proof Test means a nondestructive tension test performed by the sling manufacturer, or an equivalent entity, to verify construction and workmanship of a sling.

Rated Capacity means the maximum working load permitted by the provisions of this part.

Sling means an assembly that connects the load to the material handling equipment for the purpose of lifting or hoisting.

Vertical Hitch means a method of supporting a load by a single, vertical part or leg of the sling.

#### **12.19.4 RESPONSIBILITIES**

##### **12.19.4.1 Management**

- Establish and maintain an inspection program to record the most recent month in which a sling was repaired and/or inspected.
- Make inspection records available.
- Ensure that before new, repaired, or reconditioned slings are placed in service, that they must be proof tested.
- Assign proper sling to load (as relates to the rating capacities).

##### **12.19.4.2 Employee**

- Perform duties specified by this work practice in a safe and competent manner.
- Inspect sling for defects.
- Report defects to supervisor.

#### **12.19.5 REQUIREMENTS**

The following represent general operating practices pertaining to the use of the following slings: alloy steel chain, wire rope, metal mesh, fiber rope, and synthetic web slings:

1. A damaged or defective sling must not be used.
2. A sling must not be shortened with bolts, knots, or other makeshift devices.
3. A sling must not be loaded in excess of its specific rating.
4. A sling used in a basket hitch must have the load balanced to prevent slipping.
5. A sling must be securely attached to its load.
6. A sling, other than an alloy steel chain sling must be padded or protected from the sharp corners of its load.
7. Suspended loads must be kept clear of all obstructions.
8. Employees must keep clear of suspended loads, and loads about to be lifted.

9. Employees must not place hands or fingers between the load and the sling when the load is tightened.
10. Slack in a sling must be removed gradually.
11. A sling must not be pulled out from underneath a load when the load is resting on it.

#### **12.19.5.1.1 Inspection**

1. A sling and all fasteners must be inspected for damage and defect by a designated employee before each daily use.
2. A damaged or defective sling must be tagged and immediately removed from service.
3. Where service conditions warrant, additional inspections must be performed during sling use e.g. (extreme temperatures, wet conditions).
4. Thorough periodic inspections of alloy steel chain slings must be done to determine wear, separation or other conditions which could impact its safe use.
5. Inspections for alloy steel chain slings must be performed at least once every 12 months by a designated employee.

#### **12.19.5.1.2 Proof (Load) Testing**

Proof testing refers to a nondestructive load test performed by the manufacturer to verify the construction, capacity and workmanship. Any questions relating to visible wear or sling deterioration requires that the sling be returned to the manufacturer for proof testing. It is important to review the application and rating of a sling prior to performing its use. Before use, each new, repaired, or reconditioned alloy steel chain sling shall be proof tested by the sling manufacturer.

### **12.19.5.2 Requirements for Removal from Service**

#### **12.19.5.2.1 Alloy Chain, Metal Mesh and Wire Rope Slings**

1. Evidence of heat damage.
2. Cracked, bent or opened end attachments or hooks.
3. Kinking, crushing, bird caging, or any other distortion of wire rope slings.
4. Corrosion of sling or attachments.
5. Wear or scraping 1/3 the original diameter (wire rope) of outside individual wires.
6. Broken weld/brazed joints.
7. Distortion of handles.

8. Repairs done not by the manufacturer.
9. Reduction of diameter from abrasion or corrosion.

#### **12.19.5.2.2 Fiber Rope Sling**

1. Abnormal wear.
2. Distortion of hardware in the sling.
3. Abnormal size or shape of strands.
4. Discoloration / rotting.
5. Broke or cut fibers.
6. Repaired from old or reconditioned fiber rope.
7. Powder fiber between strands.

#### **12.19.5.2.3 Synthetic Web Slings**

1. Acid / caustic burns.
2. Melting / charring of any part of the sling.
3. Snags, puncture tears or cuts.
4. Broken or worn stitches.
5. Distortion of fittings.
6. Repaired by someone other than the manufacturer.

### **12.19.6 TRAINING**

Employees need to be instructed in the care, use, operation and hazards associated with slings and the related equipment associated before assigned a job task by the employer. Training in the aspects of how to inspect slings, rigging loads and safety precautions must be on the job or in the classroom or a combination of both by experienced supervisor.

### **12.19.7 REFERENCES**

*For additional information regarding specific sling information such as: rating capacities rating capacity reduction, and temperature thresholds refer to MIOSHA, General Industry Part 49 "Slings".*

*For additional information on the use of slings not mentioned in this section, contact the manufacturer in accordance with its application and recommended use.*

## **12.20 SPRAY FINISHING**

### **12.20.1 PURPOSE**

The requirements stated within this work practice are established to prevent injury to DMB employees who are required to work with various types of spray application equipment and coatings.

### **12.20.2 SCOPE**

These work practices apply to tasks, which consist of working with or around specific spray finishing operations involving spray guns in a fixed area (spray booths or rooms). Specifically excluded from these requirements is exterior spraying operations and portable spraying equipment. It is the responsibility of the supervisor to ensure that the information herein is effectively communicated and followed.

### **12.20.3 DEFINITIONS**

Approved means, unless otherwise indicated, approval or listing by Underwriters Laboratories, Inc. or Factory Mutual Engineering Corporation, or both.

Bonding means the interconnecting of two objects by means of a clamp and bare wire. Its purpose is to equalize the electrical potential between objects.

Combustible Liquid means any liquid having a flash point at or above 100 degrees Fahrenheit (37.8 degrees Celsius) closed up.

Flammable Liquid means any liquid having a flash point below 100 degrees Fahrenheit (37.8 degrees Celsius) closed cup and have a vapor pressure not exceeding 40 psi absolute (2068.6 mm) at 100 degrees Fahrenheit (37.8 degrees Celsius).

Grounding means the procedure used to carry an electrical charge to ground through a conductive path. (See Bonding.)

Liquids within the scope of this standard, mean combustible liquid or flammable liquid.

Spray Area means any area in which dangerous quantities of flammable or combustible vapors, mists, residues, dusts, or deposits are present due to the operation of the spray processes.

Spray Booth means a power-ventilated structure provided to enclose or accommodate a spraying operation to confine and limit the escape of spray, vapor, and residue, and to safely conduct or direct them to an exhaust system.

Spray Finishing Operations means the employment of methods wherein organic or inorganic materials are utilized in dispersed-form for deposit on surfaces to be coated, treated, or cleaned. Such methods of deposit may involve either automatic,

manual, or electrostatic deposition, but do not include metal spraying or metalizing, dipping, flow coating, roller coating, tumbling, centrifuging, or spray washing and degreasing as conducted in self-contained washing and degreasing machines or systems.

Spray Room means a room in which spray-finishing operations, which are not conducted in a spray booth, are performed separately from other areas.

Vapor Area means any area containing flammable vapor concentrations exceeding 25% of the lower explosive limit (LEL) in the vicinity of dipping and coating processes, drain-boards or associated drying, conveying, or other equipment, during operation or shutdown periods.

## **12.20.4 RESPONSIBILITIES**

### **12.20.4.1 Management**

- Provide training to each assigned employee regarding the operation, maintenance, hazards, and safeguards of his/her specific job task.
- Do not knowingly authorize a process, machine, or equipment to be used, which does not meet applicable state safety standards.
- Provide each employee with the required PPE as it applies to the specific spraying operation.

### **12.20.4.2 Employee**

- Do not operate a machine or equipment until trained in the operating procedures, hazards, and safeguards of the specific spraying operation.
- Report any recognition of hazards to the supervisor.
- Utilize required PPE or protective devices.
- Do not remove a guard or other safety device, except for authorized service operations.

## **12.20.5 REQUIREMENTS**

### **12.20.5.1 General Operation Requirements**

1. Smoking must be prohibited and "No Smoking" signs must be posted in large letters on contrasting colors in the vicinity of the following:
  - a. Solvent tanks used for cleaning parts.
  - b. Spraying areas.
  - c. Flammable and combustible liquid storage and mix rooms.
  - d. The no smoking restriction must extend 20 feet (6m) from the area unless separated by a noncombustible, vapor-tight partition.



2. Spraying areas, including floors and workbenches must be maintained so that the accumulation of deposits of combustible residues does not create a hazard.
3. Cleaning of spraying accumulations must be done with tools made of non-sparking material.
4. Spraying operations must not be done outside of the designated spraying areas.
5. After cleaning properly dispose of residue, scrapings and debris contaminated with spraying residue. Solid waste must be immediately removed from the premises and properly disposed of. Solvent contaminated rags and liquid wastes may require analysis prior to disposal. These materials may require classification as a hazardous waste.
6. The clothing of spray finishing employees must not be left on the premises for more than 24 hours unless stored in metal lockers.
7. The use of solvents for cleaning operations shall be restricted to solvents that have a flash point not less than 100 degrees Fahrenheit. For cleaning spray nozzles and auxiliary equipment the cleaning solvent's flash point must be greater than the solvent used during the cleaning operation.
8. Spray booths must not be used alternately for different types of coating materials. The combination of the materials might be conducive to a spontaneous ignition, unless all the deposits from the last operation are removed from the exhaust ducts as well as the booth itself before the second operation is applied.

#### **12.20.5.2 Fire Protection**

1. Automatic sprinklers must protect all areas used for spraying, including the interior of the booth. Where this protection is not available, other approved automatic extinguishing equipment must be provided.
2. The automatic sprinkler systems in rooms containing spray-finishing operations must conform to the provisions for high hazard occupancy.
3. Sprinkler heads must be located to effect water distribution throughout the entire booth.
4. Sprinklers protecting spraying areas must be kept free from coating material deposits. The use of polyethylene or cellophane bags having a thickness of .003 inches or less or thin paper bags is acceptable.
5. Portable fire extinguishers must be installed near all spraying areas.

#### **12.20.5.3 Flammable and Combustible Liquids**

1. A closed container, approved portable tank, approved safety can, or a properly arranged system of pipes must be used for bringing flammable or combustible liquids into the spraying area.
2. When flammable or combustible liquids are transferred from one container to the next, both containers must be grounded and bonded to prevent discharge sparks of static electricity. (Ground continuity should be verified with testing.)
3. Dispensing flammable or combustible liquids from a container more than 60 gallons must be done by approved pumps.
4. Dispensing, filling, or mixing of flammable or combustible liquids must be done in designated mixing areas or in spraying areas with operational ventilation.
5. Adequate precaution must be taken to protect against spillage of flammable and combustible liquids and sources of ignition.
6. Flammable and combustible liquid containers supplying spray nozzles must be a closed type or with metal covers kept closed. Containers under pressure must be of limited capacity and be equipped with a visible pressure gauge.
7. Containers resting on the floor must be on metal supports or supported by wire cables. Containers supplying spray nozzles by gravity flow must not be greater than 10-gallon capacity.
8. Positive displacement pumps supplying these liquids must have the discharge lines equipped with an approved relief valve.
9. When spraying operations are not being conducted, the shutoff valve at the connection between piping and hose (or flexible connection) must be kept shut off.
10. Pressure hose and couplings must be inspected at regular intervals
11. An emergency shutdown must be in place as a measure to cut off the supply of liquid to an area involved in fire.

#### **12.20.5.4 *Electrical and Other Sources of Ignition***

1. There must be no open flame, spark-producing equipment, or exposed surfaces in any spraying area or within 20 feet horizontally and 10 feet vertically thereof, unless separated by a noncombustible vapor-tight partition.
2. Space-heating appliances, steam pipes, or hot surfaces shall not be located in a spray area where deposits of combustible residue might readily accumulate.

3. Electrical wiring and equipment must be intrinsically approved.
4. There must be no electrical equipment in the spraying area where deposits of readily ignitable residue and explosive vapors may exist.
5. No portable electric lamps.
6. All metal parts of spray booths, exhaust ducts and piping systems conveying flammable and combustible liquids must be properly electrically grounded
7. Air-less spray guns and any conductive objects being sprayed must be properly electrically grounded.

#### **12.20.6 TRAINING**

Employees need to be instructed in the care, use, operation, and hazards associated with spray finishing and related equipment before being assigned a specific job task by the employer. Training should consist of information contained within this work practice requirement and other information related to the type of equipment used during spray finishing operations. Instruction can be on-the-job or classroom or a combination of both. The supervisor must retain training documentation.

#### **12.20.7 REFERENCES**

*For additional information regarding fixed fire equipment refer to MIOSHA, General Industry Safety Standard Part 9 “Fixed Fire Equipment”.*

*For additional information relating to Flammable & Combustible Liquids refer to MIOSHA General Industry Standards, Part 75 “Flammable & Combustible Liquids”*

*For additional information refer to MIOSHA Part 76 “General Industry (Spray Finishing & Dip Tanks)”*

## **12.21 TELECOMMUNICATIONS**

### **12.21.1 PURPOSE**

The requirements stated within this work practice are established to prevent injury to employees who are required to work with microwave transmission equipment and other telecommunications systems.

### **12.21.2 SCOPE**

This section sets forth safety and health standards that apply to work conditions, methods, operations, installations and processes performed on telecommunications equipment, at telecommunications centers and at telecommunications field installations.

### **12.21.3 DEFINITIONS**

Center Work means the installation, operation, maintenance, rearrangement, and approval of communications equipment and other associated equipment in telecommunications switching centers.

Field Work means the installation, operation, maintenance, rearrangement, and removal of conductors and other equipment used for signal or communication service, and their supporting or containing structures, overhead or underground, on public or private rights of way, including buildings or other structures.

### **12.21.4 RESPONSIBILITIES**

#### **12.21.4.1 Management**

- Ensure that proper labeling for potential non-ionizing radiation exposure is provided to alert employees of unguarded machinery, such as uncovered commutators and couplings.
- Provide and enforce the use of personal protective equipment where applicable. Management will ensure that personal protective devices, tools, and equipment are carefully inspected for damage and defects.

#### **12.21.4.2 Employee**

- Maintain and wear personal protective equipment where applicable.
- Report unsafe conditions and equipment.

## **12.21.5 REQUIREMENTS**

### **12.21.5.1 Employee Protection**

#### **12.21.5.1.1 Public Work Areas**

1. Before work is begun in the vicinity of vehicular or pedestrian traffic which may endanger employees, warning signs and/or flags or other traffic control devices must be placed conspicuously to alert and channel approaching traffic. At night, warning lights must be prominently displayed, and excavated areas must be enclosed with protective barriers.
2. Employees finding any fallen or crossed wires, which create or may create a hazardous situation must remain on guard or use adequate means to warn other employees of the danger and notify proper authorities.
3. Employees must use rubber-insulating equipment designed for use around electrical installations.

#### **12.21.5.1.2 Personal Climbing Equipment**

1. Body Harnesses and straps provided by the DMB must be used when work is performed at positions more than 4 feet above the ground on poles and towers that do not have adequately guarded work areas.
2. The supervisor will ensure any ladder in service is regularly inspected. Inspections must be conducted by a competent person to ensure that ladders are adequately strong, in good condition, and properly secured in storage and application.

#### **12.21.5.1.3 Vehicle-Mounted Material Handling Devices**

The supervisor will ensure that a competent person makes visual inspections of the equipment each day the equipment is to be used to ascertain it is in good condition.

#### **12.21.5.1.4 Vehicle Mounted Elevating and Rotating Work Platforms**

These devices must not be operated with any conductive part of the equipment closer to exposed energized power lines than the clearances set forth in Table R-2 of MIOSHA Part 30 (Construction Standard).

#### **12.21.5.1.5 Materials Handling and Storage**

1. When working with poles in piles or stacks, work must be performed from the ends of poles as much as possible, and precautions must be

taken for the safety of employees at the outer end of the pole.

2. During pole hauling operations, all loads must be secured to prevent displacement. Lights, reflectors and/or flags must be displayed on the ends or sides of the load as necessary.

#### **12.21.5.1.6 Cable Fault Testing and Locating**

Before the voltage is applied, cable conductors must be isolated to the extent practicable. Employees must be warned by briefing and tagging at the affected locations to stay clear while the voltage is applied.

### **12.21.5.2 Grounding for Employee Protection – Pole Lines**

#### **12.21.5.2.1 Power Conductors**

Electric power conductors and equipment must be considered as energized unless the employee can verify that they are bonded to a suitable protective ground.

#### **12.21.5.2.2 Attaching and Removing Temporary Bonds**

When attaching grounds (bonds), the first attachment must be made to the protective ground. When removing bonds, the connection to the line or equipment must be removed first. Insulating gloves must be worn during these operations.

#### **12.21.5.2.3 Overhead Lines**

This is a comprehensive and detailed requirement found under MIOSHA construction standard Part 30 Telecommunications. It is suggested that this section be referred to for detailed information. The following information will be covered in this section:

1. Handling suspension strand.
2. Need for testing wood poles.
3. Methods of testing wood poles.
4. Unsafe poles or structures.
5. Test requirements for cable suspension strand.
6. Inspection of strand.
7. Outside work platforms.
8. Other elevated locations.
9. Installing and removing wire and cable.
10. Avoiding contact with energized power conductors.
11. Handling poles near energized power conductors.
12. Working position on poles.

#### **12.21.5.2.4    Underground Lines**

This part applies to the guarding of manholes and street openings, and to the ventilation and testing for gas in manholes and vaults, where telecommunications fieldwork is performed on or with underground lines.

#### **12.21.5.3    *Guarding Manholes and Street Openings***

1. When covers of manholes or vaults are removed, the opening must be promptly guarded by a railing, temporary cover, or other suitable temporary barrier which is appropriate to prevent an accidental fall through the opening and to protect employees working in the manhole from foreign objects falling into the manhole.
2. While work is being performed in the manhole, a person with basic first-aid training must be immediately available to render assistance if there is cause for believing that a safety hazard exists.

#### **12.21.5.4    *Microwave Transmission***

DMB employees working on an energized source of microwave radiation must not look into an open wavelength, which may be connected to the source.

### **12.21.6    TRAINING**

DMB employees involved in using high voltages to locate trouble or test cables must be instructed in the precautions necessary for their own safety, and the safety of other employees. Training should consist of information contained within this work practice requirement and other information related to the type of equipment and its use within a specific work assignment.

## **12.21.7 REFERENCES AND APPENDICES**

*For additional Safety requirements relating to telecommunications activities refer to MIOSHA, Construction Safety Standards, Part 85 “Control of Hazardous Energy (Lockout)”, Part 86 “Safety Requirements for Power Generating, Transmission and Distribution”, Part 90 “Confined Space Entry, and Part 40 “Electrical Safety Related Work Practices”.*

*For additional information regarding ladder use and application, refer to MIOSHA, Construction Safety Standard Part 30 “Telecommunications”.*

*For additional information regarding installation, removal or other handling of poles, in pole lines, refer to MIOSHA, Construction Safety Standard Part 30 “Telecommunications”.*

*For additional information regarding grounding for employee protection refer to MIOSHA, Construction Safety Part 30 “Telecommunications”.*

*For additional information regarding underground lines refer to MIOSHA, Construction Standard Part 30 "Telecommunications",*

Appendices:

- A. Common Safety Practices
- B. Personal Protective Equipment



## **12.21.7.1 APPENDIX A - COMMON SAFETY PRACTICES**

### **12.21.7.1.1 Overview**

Cabling installers must know their company's safety policies and practices – and follow them while working. Be aware of any site-specific safety issues that affect a task. Pay close attention and ask questions during every company or job-site safety meeting.

A safe work environment is much more likely when each worker makes ensuring workplace safety a part of the job. Do not depend only on the efforts of others to ensure job safety.

When working, try to consider the possible effects of every action. This is especially important for actions which could have consequences in remote locations (eg., turning power on or off or activating distant machinery)

### **12.21.7.1.2 Designating Work Areas**

Always use safety cones to designate work areas and to restrict access. Yellow caution tape and folding A-frame signs may also be used. Be sure to leave enough room inside the cone perimeter to do the required work.

Consider the needs of the building occupants whenever possible. Try not to block a doorway or hallway for which there is no alternate route any longer than necessary. When working near doors or hallway corners, try to ensure that oncoming pedestrians can tell there is a work area ahead.

Do not leave open floor systems unattended. Do not leave open ceiling systems with dangling access panels or equipment unattended. Do not leave work areas cautioned off longer than required. The customer and coworkers will soon realize the work is complete and start disregarding your warnings. This could cause an accident in the future when a real danger exists.

### **12.21.7.1.3 Tools and Equipment**

Power tools should be inspected regularly to ensure that automatic cutoffs, guards, and other safety devices work properly. Follow the manufacturers recommended maintenance schedule to ensure reliable operations.

Before each use, examine power tools to ensure that all guards are in place and securely attached.

Power tools that require a three-conductor power cable must be grounded. Never use a power tool if the ground prong of the plug has

been cut off. Never use a power tool with an extension cord or adapter that eliminates the ground prong before the cord reaches the outlet

#### **12.21.7.1.4 Ladder Safety**

Cabling installers must know how to choose a ladder, place it securely, and climb and work on it safely. The location of telecommunications cabling and equipment requires that ladders will often be used for both installation and repair work.

Use the correct type of ladder. Never use a metal ladder where there is a chance that the cabling installer or the ladder will touch energized electrical cables or equipment. Use ladders made of wood or nonconductive synthetics in these situations. Most construction sites will not allow metal ladders on site for safety and insurance reasons.

Ladders should be examined before each use. Check to ensure that:

- Joints between the steps and side rails are tight.
- Anti-skid feet are secure and operating properly.
- Any moving parts operate freely.
- Rungs are free of dirt, liquids, or other substances that could cause slipping.
- Side rails are not excessively bent or dented.

Choose a secure location to set up the ladder, such as flooring or ground that is solid, level, and offers adequate traction for the ladder's feet. If adequate traction is not available, the ladder must be fastened in place or held in position by another worker or workers. Never set a ladder on top of a box, furniture, or any other unstable surface.

Place an extension ladder so that both side rails are supported at the top, unless the ladder has a single support attachment at the top. For stepladders, verify that the supports that link the ladder rails to the back rails are fully extended and locked into place.

Confirm that the extension ladder is set at the proper pitch (angle). The distance from the base of the ladder to the supporting wall should be one-quarter (25 percent) of the length of the ladder. For example, a ladder extended 6 m (20 ft) up a wall would have its base 1.5 m (5 ft) from the wall.

Extension ladders should always overlap between sections by at least three rungs. The top of the ladder should extend up to the work area and 0.91 m (3 ft) above catwalks or lofts. This allows the cabling installer to easily find the steps when getting back onto the ladder from the catwalk.

Never paint a wood ladder. Doing so will hide any stress cracks or damage.

Try to place the ladder where it will be out of traffic. Use safety cones to designate a restricted area around the base of the ladder. Never set a ladder in front of a door that opens toward the ladder, unless the door is locked or can be blocked or guarded from the other side.

When using a ladder:

- Never exceed the ladder's weight rating. Most ladders are designed for one person only.
- Always face the ladder when climbing up or down.
- Never stand on the top two rungs of a ladder.
- Never leave any object (tools, gloves, etc.) on any rung of a ladder.
- Never straddle a ladder or stand on the rear rungs. The rear rungs are narrower than the front steps and are not designed to support weight.
- Never intentionally drop or throw down anything (tools, excess wire, scraps, etc.) from a ladder. Use a hand line and a "grunt sack" to raise and lower items.

#### **12.21.7.1.5 Personnel Lifts**

A bucket lift is a fiberglass bucket mounted on the end of an extendable arm in which the user stands. The articulating arm allows the user to approach the work area from several angles and to avoid obstacles or possible safety hazards. These units are usually large and can be used in limited areas.

Lifts must be secured by setting brakes and using stabilizing legs or outriggers, if equipped.

Personnel must be surrounded by side rails or the bucket's outer walls and should wear a full body harness with two lanyards, one of which must be attached to the lift at all times.

## **12.21.7.2 Appendix B – PERSONAL PROTECTIVE EQUIPMENT**

### **12.21.7.2.1 Overview**

Personal protective equipment is safety equipment worn by the telecommunications cabling installer. When used correctly, personal protective equipment greatly decreases the cabling installer's risk of injury. When it is used incorrectly – or not used – it can leave the cabling installer exposed to a wide variety of dangers.

The personal protective equipment that a cabling installer is required to wear when performing a task depends on:

- The hazards of the task.
- The hazards at the work site.
- Local, state, and national safety requirements.

Personal protective equipment must fit well and be as comfortable as possible. Equipment that fits properly and comfortably ensures that the cabling installer and the protective equipment can work at the same time.

Pay careful attention to the training for each item of personal protective equipment. Be sure to learn:

- When the equipment must be used.
- How to put on, adjust, and take off the equipment.
- What the equipment can and cannot protect against.
- Care and maintenance of the equipment.

It is important to inspect personal protective equipment each time it is used. Look for wear, cracks, tears, punctures, weak joints, or other signs that the equipment may not be able to provide protection. Report any problems to the proper supervisor. Never use defective protective equipment.

Remember that no amount of protective equipment can provide complete protection. Often the best personal protection comes from using caution, proper procedures, and common sense when working.

### **12.21.7.2.2 Headgear**

Cabling installers must wear protective headgear (hardhats) when working in any area where there is a danger of:

- Falling or flying objects.
- Electric shock.
- Striking their heads.

Generally, the hardhats provided for telecommunications cabling installer afford both physical and electrical protection. Cabling installers should ensure that their hardhats provide electrical protection before working around power lines or equipment.

The hardhat must fit securely enough to ensure that it will not slip and block the cable installer's vision or fall onto the equipment the installer is working on. Cabling installers may choose to use a chinstrap to secure the hardhat only if the chinstrap is thin enough to give way easily if the hardhat catches on something during a fall.

Before putting headgear on, inspect it for cracks, weakness of the internal support structure, or other defects.

#### **12.21.7.2.3 Eye Protection**

Cabling installers must wear eye protection (full-face shield, goggles, or glasses) whenever there is a potential hazard to the eyes. If the cabling installer must wear prescription glasses to correct vision, prescription safety glasses with side shields may be required or goggles that fit over personal prescription glasses can be used. All eye protection must meet or exceed MIOSHA requirements. A wide variety of work situations require eye protection including:

- Working with batteries.
- Using power-fastening tools.
- Working with optical fibers.
- Any situation in which the cabling installer is working above eye level and looking up at the work.

Cabling installers who wear prescription lenses must have eye protection that either fits over the prescription lenses or includes the prescription in the protective lenses.

#### **12.21.7.2.4 Breathing Protection**

Cabling installers must wear a respirator or filter mask whenever harmful dust, gas, smoke, chemical vapor, or other pollutant is present at the work site.

#### **12.21.7.2.5 Gloves**

Cabling installer must wear physically protective gloves when performing any work that has the potential for hand or forearm injuries.

- Leather gloves provide protection from cuts, abrasions, and extreme temperatures.
- Rubber gloves provide protection from harmful chemicals.

Notes: Rubber and leather gloves are not for high-voltage use. All high-voltage situations should be referred to qualified persons.

#### **12.21.7.2.6 Hearing Protection**

Hearing loss is one of the most frequent injuries encountered in the construction trades. The victim does not feel any pain, but after years of

exposure to high levels of construction noise, varying frequencies of their hearing may be lost.

Wear hearing protection while working in the vicinity of loud noises. Even the sound of a hammer striking a metal clamp onto red iron requires hearing protection. If the cabling installer experiences a ringing the ears, hearing protection is not adequate.

There are three major types of hearing protection:

- Disposable, foam plugs – These plugs can be rolled between the fingers and slipped into the ear canal.
- Reusable rubber earplugs – These may be on a breakaway cord or individually housed in a pocket-sized plastic container. These are convenient because they can be attached to a hardhat or around the cabling installer's neck and tucked inside the installer's shirt. It is vital that they be on a breakaway cord to prevent strangling.
- Aural – These types resemble earmuffs. They are available in passive or active models. When wearing the active models, normal conversation can be heard; however, when a loud noise occurs, the protection automatically dampens the louder sound.

When working in a noisy work site (with or without earplugs) be careful not to rely on hearing to detect the location of machinery, co-workers, or other hazards.

#### **12.21.7.2.7 Clothing**

Work clothing should be reasonably snug but must allow the cabling installer to move freely. Do not wear dangling or floppy clothing that may get caught on tools or surroundings. Keep shirttails tucked in, cuffs (if any) buttoned or neatly rolled up, etc. This is especially important when the cabling installer is working in a confined space, on an elevating device, or near operating machinery.

#### **12.21.7.2.8 Electrical Hazards**

The presence of electrical power cabling and electrical equipment is probably the most common environmental hazard faced by cabling installers. Like telecommunications cables, electrical power cables run in walls, under floors, and over ceilings. Power is also required for telecommunications equipment in closets and equipment rooms.

All electrical systems are potential killers; therefore, all personnel should be aware of the dangers and have electrical safety training. Use power tools and equipment only for the purposes for which they were made. Use tools only according to the manufacturer's instructions.

Wear rubber-soled shoes and remove all metallic jewelry. Most jewelry is made of gold or silver, which are two of the best electricity conductors.

Never intentionally expose yourself to an electrical shock. That is, do not run your finger down a termination block to check for ringing current. Physical effects of current are as follows:

- 2-3 mA: produces a tingling of the skin.
- 10 mA: produces a painful shock and the muscles cannot release the contact.
- 50-100 mA: breathing becomes difficult.
- 100mA: ventricular fibrillation occurs, causing the heart to repeatedly relax and violently clamp shut. This action destroys the heart and usually results in death.
- 200 mA and above: the heart clamps shut, severe burns occur, and a sickening smell is produced as the skin and hair burn away. At this level, the damage to the heart may actually be less than at the 100 mA, allowing the victim to survive if medical treatment is given in time.

Treat all electrical circuits as if they were live (energized). Even after the circuits have been turned off and tested to ensure that they are off, treat electrical circuits as if they were likely to become live again at any moment. Always lock out all electrical circuits that have been turned off. Continue to maintain the proper clearances, wear the proper personal protective equipment, and take all the proper precautions.

Cabling installers must be especially careful in situations where electrical circuits or equipment may be contacted blindly (drilling into walls, fishing conduits, etc.).

**WARNING:** Do not use a metal fishtape in a conduit if the exit point is unknown.

Avoid working in standing water. If cabling installers must work in standing water (e.g., in a basement tunnel), take extra care to ensure that there are no electrical power circuits near the water or the work area.

Never cut the ground prong off a power tool plug. Removing the ground prong creates a serious possibility of severe electrical shock for the worker using the tool.

Avoid working on energized equipment. If the cabling installer must work on an energized circuit such as performing an alignment in a microwave radio or troubleshooting a telephone system, have a qualified safety person standing by. A qualified safety person will know:

- Where and how to secure electrical circuits.
- First aid and CPR.
- Where and how to get help.

#### **12.21.7.2.9 Access Floors**

Raised computer flooring is becoming very popular in equipment rooms. There are potential dangers associated with access flooring:

- These floors are usually part of the HVAC distribution system. When a floor tile is removed, pressure is released while dirt, dust, and debris flies at the installer. Safety glasses are a must while a face filter is suggested.
- Floor systems are usually constructed with metal pedestals interconnected with stabilizing stringers joining them. The floor tiles are then placed on top so each pedestal will support the intersection of four separate tile corners. These systems are very stable, even with several tiles removed. Another construction method is without the stringers. The floor maintains its stability when all the tiles are in place. Never remove all the tiles in a single row if stringers are not used for stability. There is danger of the entire floor collapsing if it shifts towards the open row where the tiles were removed.
- When tiles are replaced, it is often like a jigsaw puzzle if the tiles are not placed exactly in the same spot the floor will often have loose tiles that wobble when walked on.

#### **12.21.7.2.10 Crawl Space Hazards**

Telecommunications cabling often runs over suspended ceilings, below raised floors, and in other spaces where cabling installers cannot stand upright. These areas are called crawl spaces.

It is a good idea to wear protective headgear (hardhat) when working in crawl spaces, especially when electrical wiring is present. The hardhat will also protect the cabling installer's head from the hard surfaces and sharp edges that may be found on the supporting hardware for the floor or ceiling system.

Ensure that lighting is adequate to see the work clearly. If not, use a flashlight or other work light for extra light.

Before beginning work in any crawl space, take the time to locate and identify any other facilities that are routed through the crawl space (electrical power wiring, pipes, HVAC ducts, etc.). Identifying surrounding hazards can keep the cabling installer from accidentally damaging another system or endangering himself/herself.

A filter mask or other breathing protection may be required if dust, fibrous insulation, or other breathing hazards are present in the crawl space. Check with employers and the building management to determine the nature of the hazard and the protection required.



When moving through a crawl space, walk or crawl only on surfaces designated to support walking or crawling. The cabling installer should never put weight on ceiling support hardware that is not designed to support crawling or walking. Before putting full weight on a walk or crawl surface, the cabling installer should ensure that the surface is strong enough to bear weight. Never put weight on cable support devices (cable trays, etc.).

Never intentionally drop or throw anything (tools, excess wire, scraps, etc.) from a crawl space above a suspended ceiling. Do not drop, place, or throw anything on top of the ceiling tiles.

Crawl spaces may be considered as confined spaces that require additional precautions. *See Section 10.1 "Confined Spaces" for more information.*

#### **12.21.7.2.11 Confined Spaces**

According to OSHA 1910.146-Permit-Required Confined Spaces, "a confined space:

- Is large enough and so configured that an employee can bodily enter and perform assigned work; and
- Has limited or restrictive means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry); and
- Is not designed for continuous employee occupancy."

Certain confined spaces may require:

- Breathing apparatus.
- Protective clothing.
- A trained safety person stationed outside the space.
- A lifeline attached to the worker inside the space.

#### **12.21.7.2.12 Optical Fiber Hazards**

Optical fiber systems involve some hazards that copper cabling systems do not. Most of these different hazards involve the optical fiber or the transmission light source.

Optical fibers are very thin but surprisingly strong. Small scraps can easily penetrate skin, causing irritation or infection. Ensure that cleanup is thorough after any optical fiber splicing or termination. Many workers use a loop of sticky tape or a container to collect fiber scraps after each cut. This ensures that all scraps can be disposed of properly at the end of the job.

Never throw bare fiber scraps into community trash containers. Always seal fiber scraps in a container, tape it closed, and mark it as optical fiber glass scraps. Take the container directly to the dumpster to avoid accidents to the unsuspecting customer.

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Never look into the end of an optical fiber cable. Most optical fiber transmission light is invisible but can burn the retina of the eye before the cabling installer realized that the light is on. Light sources for test equipment may be just as hazardous as the regular system light source.

Always wear eye protection when handling exposed fibers. Small fragments of optical fiber can easily fly into the eyes during cleaving. Exposed fiber ends can injure the eyes when cables twist, flip, or fall.

## **12.22 TRACTORS AND MOBILE EQUIPMENT**

### **12.22.1 PURPOSE**

These requirements established within this work practice are intended to protect worker safety for those employees who operate tractors in non-agricultural operations.

### **12.22.2 SCOPE**

This part provides for the safe care and use of tractors and mobile equipment identified as earth moving equipment including scrapers, loaders, crawler or wheel tractors, bulldozers, off highway trucks, graders, agricultural and industrial tractors and similar equipment used in construction operations.

### **12.22.3 DEFINITIONS**

Attachment means a removable or permanently mounted device on a tractor, such as, but not limited to sweepers, mowers, blades, forks, front-end loaders, and post hole diggers.

Drift means to remove without control.

Fork-Lift Tractor means a high-lift, self-loading tractor equipped with load carriage and forks for transporting and tiering loads.

Free Play means an uncontrolled movement.

Load-Axle means a tractor axle nearest the load.

Load Backrest Extension means a device extending vertically from the fork carriage frame.

Load Engaging means a load-handling device attached to a tractor for the purpose of handling a load.

Low-Profile Tractor means a wheeled tractor possessing all of the following characteristics:

1. The front wheel spacing is equal to the rear wheel spacing, as measured from the centerline of each right wheel to the centerline of corresponding left wheel.
2. The clearance from the bottom of the tractor chassis to the ground is not more than 18 inches.
3. The highest point on the hood is not more than 60 inches.
4. The tractor is designed so that the operator, when seated, straddles the transmission.

Mast means a support member providing the guide way permitting vertical movement of the carriage.

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Nonagricultural Operation means work activity other than that designated in major groups 01 and 02, that is, agricultural production of crops and livestock of the Standard Industrial Classification Manual, United States Bureau of the Budget, 1972 edition, and includes any practices other than those performed by a farmer. Examples of nonagricultural operations are landscaping, groundskeeping, roadway maintenance, construction services, loading and digging.

Operator means an employee who has been trained and authorized by the employer or his /her designated representative to operate a tractor.

Overhead Guard means a framework fitted to a tractor over the head of a riding operator to protect the operator from falling objects.

Parking Brake means a device to prevent the movement of a parked vehicle or trailer.

ROPS means a rollover protective structure. ROPS may be a protective frame or a protective enclosure mounted to a tractor.

Self-Loading means the capability of a tractor to pick up, carry, set down, and, in case of high-lift types, to stack or tier its load without the aid of external means.

Service Brake means a device designed to bring a moving tractor to a halt.

Tractor means one of the following

- "Agricultural-type tractor" means a 2 or 4 wheel drive vehicle of more than 20 engine horsepower and designed to furnish the power to pull, carry, propel, or drive attachments primarily intended for use in agricultural operations.
- "Industrial tractor" means a 2 or 4 wheel drive vehicle of more than 20 engine horsepower designated as an industrial tractor by the manufacturer, but having the appearance of an agricultural tractor, and designed to furnish the power to pull, carry, propel, or drive attachments primarily intended for industrial use.

Tiering means a process of placing a load on or above another load.

Tractor Weight means the combined weight of the protective frame or enclosure, all fuels, and other components required for the normal use of the tractor.

### 12.22.4 RESPONSIBILITIES

#### 12.22.4.1 *Management*

- Assure that each tractor or rubber-tired self-propelled scraper, front-end loader, bulldozer, crawler tractor, and crawler-type loaders, and motor graders having a ROPS is equipped with a seat belt.
- Provide training to an employee prior to the employee's assignment as an operator of a tractor. This training must include capabilities of the equipment and its attachments.

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- Explain to employees the purpose, use, and limitations of controls.
- Explain to employees how to make daily checks.
- Have employee's practice operating assigned tractors through the functions necessary to perform the required jobs.
- Enforce use of seat belts when provided. Material handling machinery as described in the scope section are required to be furnished with seat belts when such equipment is manufactured on or after September 1<sup>st</sup>, 1972.
- Do not allow employee to operate tractor not equipped with ROPS on any slope that could cause the tractor to overturn.
- Establish a procedure that assures that an employee is trained, tested and qualified to operate a tractor prior to authorizing the employee to operate a tractor. (A permit system will be used to comply with this rule).

### **12.22.4.2 Employee**

- Understand the requirements for the safe use, care and protection needed to safely operate a tractor, equipment or attachments.
- Satisfactorily demonstrate ability to safely operate tractor and its equipment.
- Wear seat belt while operating a tractor equipped with ROPS.
- Have corrected vision that meets the requirements for a valid Michigan driver's license.
- Have effective use of all four limbs.
- Be of a height sufficient to operate the controls and have an unobstructed view over the controls and dashboard.
- Have coordination between eyes, hands, and feet.
- Have freedom from convulsive disorders or episodes of unconsciousness.
- Have the hearing capability to hear and understand conversational levels of sound in an ordinary office environment.
- Have the ability to understand signs, labels, and instructions.
- An employee who has operated the vehicle prior to May of 1979 and is not meeting the above requirements is exempted from these rules as long as he/she can safely operate the vehicle.

#### **12.22.4.3 Requirements**

1. Operators must not operate tractors or any mobile equipment on a slope that could cause the equipment to overturn, unless equipped with ROPS.
2. Where a low-profile tractor is used and where the vertical is insufficient to allow a ROPS-equipped, low profile tractor to operate, and where it is used inside a building, is excepted from this requirement.
3. Covers, caps, and breathers for batteries, fuel tanks, oil reservoirs, and coolant systems must be kept in place.
4. Any pinch point or shear point created by a tractor or any mobile equipment or attachment that creates a hazard, to which an operator in normal operating position is exposed, must be guarded.
5. A master shield must guard power take-off shafts on tractors.
6. Power take-off driven equipment must be guarded to prevent employee contact with the positively driven, rotating member of the power-driven system. Where the power take-off driven equipment is of a design requiring the removal of the master shield, the attaching equipment must include protection from that portion of the tractor power take-off shaft that protrudes from the tractor.
7. A tractor shall not be used in an environment that is likely to contain an ignitable mixture of gases, vapors, dusts, or fibers unless it is designed to do so.
8. A tractor with an internal combustion engine shall not be operated in a building or enclosed area unless ventilation is provided.

#### **12.22.4.4 Operating Rules**

1. No one except the operator shall ride on a tractor unless a seat is provided and a seat belt worn.
2. A tractor shall be visually inspected prior to each shift to assure that there are no visible defects. Report defects to supervision.
3. An operator shall not drive a tractor up to anyone who is standing in front of any fixed object.
4. An operator shall not allow anyone to stand or pass under the elevated end of any tractor or its attachments.
5. An operator shall not put his arms or legs outside of the moving wheels of a tractor.

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6. When a tractor is temporarily parked within the vision of or within 25 ft. of the operator, the controls shall be neutralized and parking brake set.
7. When parked overnight, or left unattended, the power shall be shut off and the controls and attachments set so as to preclude any motion.

### **12.22.5 TRAINING**

Employees need to be instructed in the care, use, operation and hazards associated with tractors and mobile equipment including attachments and other related equipment before being assigned a job task by their supervisor or facility manager.

Training should consist of information contained within this work practice requirement and other information related to the type of equipment and its use within a specific work assignment. Instruction can be on-the-job or classroom or a combination of both. The supervisor must retain training documentation.

### **12.22.6 REFERENCES**

*For additional information regarding guarding and component specifications, refer to MIOSHA, General Industry Standards Part 22 "Tractors" and MIOSHA, Construction Safety Standards, Part 13 "Mobile Equipment".*

## **12.23 TREE TRIMMING AND REMOVAL**

### **12.23.1 PURPOSE**

The requirements stated within this work practice are established to prevent injury to all employees involved in tree trimming and removal operations, as well as, the safe use of associated equipment and attachments.

### **12.23.2 SCOPE**

These requirements establish safety requirements for tools and equipment, their maintenance and repair, and the work practices used in spraying, trimming, pruning, repair and removal of trees by employees and their use in around and about state owned facilities and other DMB operations.

### **12.23.3 DEFINITIONS**

Bucking means to cut a felled tree into lengths.

Cabling means to secure a limb into a position by means of a cable from the limb to another limb.

Chipper means a mechanical device that reduces limbs and branches to small chips.

Direct contact means to touch a conductor with a part of the body.

Felling means to cut a tree from its stump.

Flammable Liquid means a liquid having a flash point below 100 degrees Fahrenheit.

Indirect Contact means to touch a conductor with a branch, limb, tool or equipment in contact with a body part.

Limbing means to cut limbs from a felled tree.

Qualified Line Clearance Tree Trimmer means an employee trained to work in the proximity of energized conductors such as, but not limited to, an employee for an electric power or communication company.

Saddle Belt or Rope Saddle means a personal protective device used to support an employee when connected to a climbing rope or safety strap. The saddle belt or rope saddle encloses the waist and legs or hips of the wearer.

Safety Strap means a restraining line secured at both ends to a safety belt or saddle to hold an employee to a fixed object. "Scare line" means a rope used to attach tools or equipment to a safety belt or saddle.

System Operator/Owner means the person or organization that operates or controls the electrical conductors involved.



Tree Worker means an employee who does tree pruning, trimming, repairing or removal and works with the equipment used in such operations.

Topping means to cut off the uppermost parts of a tree.

## **12.23.4 RESPONSIBILITIES**

### **12.23.4.1 Management**

- Provide training to each new employee regarding the requirements of MIOSHA standard Part 53. Tree Trimming and Removal, the job hazards and safeguards before allowing the new employee to start their assigned job.
- Conducted a job briefing before beginning any tree job involving unusual hazards.
- Do not allow a tool or equipment to be used which is not guarded according to state standards, has a defective guard or is otherwise unsafe.
- Ensure that rescue procedures are established for the removal of injured employees from positions aloft.

### **12.23.4.2 Employee**

- Report to his/her supervisor any tool, safeguard or equipment which is defective.
- Use personal protective equipment as required.
- Remove a guard only when authorized for operational or maintenance purposes. The guard must be replaced before equipment is returned for normal use.
- Operate equipment only when trained and authorized in the operating procedures, hazards and safeguards.

## **12.23.5 REQUIREMENTS**

### **12.23.5.1 Personal Protective Equipment**

1. Eye protection must be used where there is the hazard of flying particles, chips, foreign body or any other hazard that could cause injury to the eyes.
2. Head protection must be worn where there is danger or hazard that may involve injury to the head.
3. Employees working aloft in a tree must wear a safety strap, tree trimming saddle belt or rope saddle.

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4. Hardware for safety harnesses shall be forged steel or metal of equivalent strength.
5. The climbing rope shall not be less than ½", 3 or 4 strand first grade manila. The climbing rope shall not be used to lower tree parts or handle equipment and shall be inspected for defects before each day's use.
6. Employees exposed to vehicular traffic must wear an orange reflectorized vest or jacket.
7. During spray operations (application of pesticides and herbicides) employees will wear appropriate respiratory protection.

### **12.23.5.2 Fire Prevention**

1. Flammable liquids must be stored in approved safety containers equipped with an automatic closing cap and flame arrester.
2. Equipment must be turned off while being refueled, serviced or maintained. Portable equipment such as chainsaws must be restarted no less than 10 feet from a refueling point.
3. Smoking must be prohibited while refueling.

### **12.23.5.3 Traffic Control**

A means such as, but not limited to, a barrier or traffic control director must be provided where the fall of a tree, or limb would create a hazard to an employee, pedestrian or vehicular traffic.

### **12.23.5.4 Electrical Hazards**

1. The location of underground utilities must be determined before any digging or ditching operations are started. (Call Miss Dig 1-800 482-7171.)
2. A tree worker or qualified line clearance tree trimmer shall not make a direct contact with an energized conductor.

### **12.23.5.5 Work Practices**

1. DMB employees must not climb a tree during a storm or high wind, or when covered with ice or snow, except when performing emergency service.
2. The climbing employee shall remain tied in until the work is completed and has returned to the ground.

**12.23.5.6 Pruning and Trimming**

1. If another employee is present the employee aloft must give a verbal warning before dropping a limb.
2. A separate work rope, controlled by the employee on the ground, must be used to lower limbs, which cannot be dropped.
3. A cut branch or limb must not be left aloft overnight or for an extended period unless the limb is secured to the tree or the area under the tree is roped off or barricaded.
4. Whenever an employee is aloft in excess of 15 feet, a second employee or supervisor must be within vocal hearing distance of the treed employee.

**12.23.5.7 Limbing**

1. When possible, an employee cutting a limb must work from the side opposite and uphill of the cut.
2. Branches bent under tension must be considered hazardous and the situation corrected.

**12.23.5.8 Topping**

1. Equipment such as a crane may be needed to lower branches and limbs when topping if the tree cannot stand the strain.
2. When lowering large sections of limbs, the employee aloft when possible, must position themselves above the limb being lowered.

**12.23.5.9 Cabling**

1. Branches or limbs to be connected must be brought to position by a block and tackle, hand winch or come-along.
2. Not more than two employees must be aloft working at opposite ends.
3. Employees on the ground must not be directly under the work area.
4. An employee must be off to one side when releasing a block and tackle, hand winch or come-along in case the fasteners let loose.

**12.23.5.10 Felling**

1. Before starting a cut, the feller must check the area for other employees, dead limbs, angle of tree, wind conditions and location of other trees or hazards (power lines). The feller should also plan his/her path of retreat.

2. Other employees assisting in the operation must be instructed on exactly what they are to do. Other persons must be cleared a distance of twice the height of the tree being cut.
3. To reduce the possibility of the tree splitting an undercut must be large enough to safely guide the tree. A back cut must be made that will leave sufficient hinge wood (the distance between the notch and back cut) to guide the tree's fall in the desired direction and to hold the tree to the stump during most of its fall. A back cut must be about 2 inches above the undercut and as level as possible.
4. A feller must clear the area of other persons or equipment before starting the back cut.

**Important Notes:**

1. The saw must be shut off before the feller starts his/her retreat.
2. A feller must start the cut from the uphill side if the tree is likely to slide or roll.
3. An audible warning must be given just before the tree is ready to fall.
4. If there is a danger of the tree falling the wrong way, such means such as wedges, block and tackle or rope must be used to control the fall.

**12.23.5.11 *Bucking***

1. An employee must work from the uphill side.
2. The log or limb must be blocked to prevent rolling.
3. Wedges must be used on trunks and limbs of large trees to prevent binding the saw guide bar or chain.

**12.23.5.12 *Brush Removal and Chipping***

1. Cut trash and logs must not be allowed to accumulate and present a hazard in the work area.
2. A chipper must be fed from the side of the centerline of the opening and the employee feeding the chipper must immediately turn away when the brush is taken into the rotor chamber. Where applicable the chipper should be fed from the curbside.
3. An employee must not place any part of their body on the chipper table nor must the discharge chute be raised while the rotor is turning.
4. Foreign material such as, stones, bottles, nails or sweepings must not be fed into the chipper.

5. Employees feeding the chipper must not wear loose sleeves, gauntlet gloves, watches or rings. Note: Rings covered by gloves or tape will be considered in compliance with MIOSHA Standards.

### **12.23.5.13 Tools and Equipment**

#### **12.23.5.13.1 Mobile Equipment**

1. The muffler and exhaust pipes of mobile equipment must be guarded to prevent employee contact.
2. DMB employees must report any known malfunctions or defects of mobile- equipment, which effect its safe operation to allow for corrections before being placed into use.
3. Employees must not attempt to place hands or fingers into any opening to detect hydraulic leaks unless equipment is shut off and depressurized. Before backing up with any mobile equipment the operator must check the rear area. A back up alarm may be necessary or the operator must use another employee for assistance.
4. Any equipment or tools carried during transit must be properly secured.
5. When outriggers are provided they must be extended. An audible warning device must be used when lowering outriggers (horn, voice or bell).

#### **12.23.5.13.2 Aerial Lifts**

1. A bucket of an aerial lift must be keep away from power lines.
2. Aerial lifts used by DMB employees must not be used to lift or lower materials unless specifically designed to perform such operations.
3. No employee must ride a bucket while the vehicle is moving.

#### **12.23.5.13.3 Brush Chippers**

1. The ignition system must be kept locked while the unit is unattended.
2. All access panels used for maintenance access must be closed and secured before the equipment is operated.
3. When a trailer type chipper is detached from a vehicle it must be chocked or otherwise secured.

#### **12.23.5.13.4 Sprayers and Related Equipment**

Employees operating spray equipment from a moving vehicle must wear a seatbelt if provided.

#### **12.23.5.13.5 Hand and Portable Tools**

##### ***12.23.5.13.5.1 Portable Electric Powered Tools (see Section 12.9)***

1. Do not use portable electric powered tools near an energized conductor where the tool or cord could possibly come into contact with the conductor.
2. Ground all tools that are not double insulated and labeled as such.
3. Extension cords must have a connected ground wire, be free of defects, and have no metal sockets.
4. Use tools in a manner that prevents cords from being entangled, damaged or cut by blades or bits.
5. Never lay an extension cord in water, unless it is waterproof, has waterproof connections, and has never been spliced.

##### ***12.23.5.13.5.2 Hand Tools***

1. Employees should not carry tools in their hand while climbing. All tools should be raised and lowered by a hand line, carried on a tool belt or in a tool bag. Pole saws or pruners may be raised and hooked ahead of the climber.
2. Hand tools should not be dropped from aloft. Tools should be lowered using a method listed above.

##### ***12.23.5.13.5.3 Ropes***

1. Ropes must be inspected for defects prior to each day's use. Ropes with abrasions, cuts, broken fibers, etc. should be replaced.
2. Ropes should be stored in a dry location in coils or on a reel.
3. Wet ropes should be dried in the sunshine or a warm room by hanging loosely over a rounded peg or hook.
4. Climbing ropes should not be spliced or left aloft overnight.

5. Ropes should not be kinked or run over sharp corners.
6. Ropes should not be used when frozen or left in freezing temperatures when wet.

#### **12.23.5.13.6 Power Saws and Pruners**

1. Employees must not raise or lower a power saw from a tree while the motor is running.
2. A saw motor must not be left running while the saw is left unattended.

#### **12.23.5.13.7 Ladders**

Metal ladders must not be used next to electrical conductors or wires within a distance equal to twice the extended length of the ladder.

### **12.23.6 TRAINING**

Employees need to be instructed in the care, use, operation and hazards associated with tree trimming and related equipment before being assigned a job task by the employer. Training should consist of information contained within this work practice requirement and other information related to the type of equipment and its use within a specific work assignment.

Instruction can be on-the-job or classroom or a combination of both. The trades' supervisor must retain training documentation.

### **12.23.7 REFERENCES**

*For additional information regarding related requirements see MIOSHA, General Industry, Part 53 “Tree Trimming and Removal”.*

*For additional information regarding minimum working distances for tree trimmers and line clearance tree trimmers refer to MIOSHA, General Industry Standard Part 53 table 1 and table 2, Rule 5321 “Tree Trimming and Removal”.*

*For additional information see MIOSHA, General Industry Safety Standard Part 33 “Personal Protective Equipment”.*



## **12.24 VEHICLE MOUNTED ELEVATED AND ROTATING PLATFORMS**

### **12.24.1 PURPOSE**

The following requirements apply to the safe operation, maintenance and use of vehicle mounted, elevated and rotating work platforms.

### **12.24.2 SCOPE**

Only trained employees will operate aerial lifting devices. Manufacturers' representative or otherwise qualified individual should conduct this training. The safety coordinator or facility manager will maintain training documentation. The following information must be reviewed as a component of the training program in addition to the manufacturers' recommended operating and maintenance requirements.

### **12.24.3 DEFINITIONS**

Aerial Device means any vehicle mounted device, telescoping or articulating or both, which is used to raise personnel to an elevated work position.

Articulating Boom platform means an aerial device with two or more hinged boom sections.

Articulating Ladder means an aerial device consisting of a single or multiple section extension ladders.

Extensible Boom Platform means an aerial device except ladders, with a telescopic or extensible boom.

Instability means a condition of a mobile unit in which the sum of the moments tending to overturn the unit is equal to or exceeds the sum of the moments tending to resist overturning.

Insulated Aerial Device means an aerial device designed for work on or near energized lines and apparatus.

Mobile unit means a combination of an aerial device, vehicle and related equipment.

Override means to transfer or to take away platform control function by another station.

Platform means a personnel-carrying device, such as a basket, bucket, stand or equivalent, which is a component of an aerial device.

Qualified Line Clearance Tree Trimmer means an employee trained to work in proximity of energized transmission and distribution lines.

Qualified Lineman means an employee trained and authorized to work on or near energized lines. An employee who is in a training program is included in this definition.

Qualified Telecommunications Employee means an employee trained to work on communication lines in the proximity of energized power transmission and distribution lines.

Safety Factor means the ratio of the breaking strength of a piece of material or object to maximum designed load or stress applied when in use.

Telescopic Derrick with A Personnel Platform Attachment means an extensible boom platform when used with a personnel platform.

Vehicle means any carrier that is not manually propelled.

Vehicle Mounted Elevated and Rotating Platform means an aerial device.

Vertical Tower means an aerial device designed to elevate a platform in a substantially vertical axis.

## **12.24.4 RESPONSIBILITIES**

### **12.24.4.1 Management**

- Provide training to an employee in the operations, hazards and safeguards concerning an aerial device, control operation and instruction for the proper use of the specific equipment.
- Ensure that aerial devices are maintained in a condition free of known defects and hazards, which could cause injury.
- Ensure that aerial devices are inspected and tested annually for operation and wear.

### **12.24.4.2 Employee**

- Operate an aerial device only after being trained and authorized by department or division management.
- Report any known defect and hazard to their supervisor or member of management.

## **12.24.5 REQUIREMENTS**

In addition to manufacturers' guidelines, the following safe practices should be observed while operating or working near aerial devices:

1. Test-lift controls, guardrails and attachments each day prior to use.

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2. When working from an aerial lift, a safety belt or harness must be worn and a lanyard attached to the boom or basket. Belting off to an adjacent pole, structure, or equipment is NOT permitted.
3. Do not sit or climb on the edge of the aerial lift basket.
4. Set brakes on boom trucks. When using outriggers, position pads on a solid surface.
5. Don't move an occupied aerial truck with the boom elevated in a working position unless the equipment is specifically designed for such work.
6. Any aerial lift exposed to traffic must have clearly visible flashing warning lights operating during use.
7. Do not operate aerial devices with any portion of the lift closer than 10 feet from live overhead electric power lines unless the lift is specially designed for such a purpose and the occupants are specially trained for such work. Any overhead line must be considered to be an energized line.
8. Wheel chocks shall be installed before using an aerial device on an incline.
9. An aerial device shall be mounted on a vehicle capable of sustaining or reinforced to sustain the imposed load.
10. An aerial device must not be modified unless approval is received from the manufacturer.
11. Lifting controls shall be tested each day before use to determine that the controls are in safe working condition. An aerial device with defective controls shall not be used until repaired. An example of a serious condition would be drift within the hydraulics system.
12. The area around the aerial device shall be inspected to assure clearance for the platform and other parts of the unit.
13. Only personnel, their tools, and necessary materials shall be on or in the platform.
14. The guardrail system of the platform shall not be used to support materials, or other work platforms, or employees.
15. Employees must maintain firm footing on the platform while working on the platform. The use of railings, planks, ladders or other devices on the platform is prohibited.

#### **12.24.5.1 Controls**

1. Operating controls must be permanently labeled.
2. Operating controls should be designed to prevent accidental activation.
3. Dual sets of operating controls should exist on all articulating boom platforms (one set for the elevated platform and one set for the ground level. The ground level controls must be capable of over-riding the platform controls.

#### **12.24.6 TRAINING**

It is the responsibility of the supervisor to ensure that all employees authorized to operate an aerial device receive periodic training. A manufacturer representative or an otherwise knowledgeable person should conduct the training program.

Training should include the following:

1. Operating instructions (manufacturers guide) and recommended safe practices including an explanation of manufacturers' warning labels, and instructions displayed on the work platform.
2. Hazards, which could be reasonably encountered, and what safeguards exist to protect the user.
3. Maintenance and care of the aerial device in a condition free of known defects and hazards, which could cause injury.

#### **12.24.7 REFERENCES**

*For additional information regarding specifications of vehicle mounted and elevating platforms and their associated components, refer to MIOSHA, General Industry Safety Standard Part 58 “Vehicle Mounted Elevating and Rotating Platforms”, and MIOSHA, Construction Safety Standard Part 32 “Aerial Work Platforms”.*

## **12.25 VISITOR AND CONTRACTOR SAFETY PROGRAM REQUIREMENTS**

### **12.25.1 PURPOSE**

The purpose of these program requirements is to promote workplace safety and reduce injuries. This information when used in conjunction with those of nationally recognized standards, such as the National Fire Protection Code, National Electric Code, BOCA Code and equipment manufacturers recommendations, should result in a reasonably safe work environment for the contractor, service provider, DMB personnel and the public.

### **12.25.2 SCOPE**

The following information applies to those activities, which have specific requirements for contractors referenced by a variety of MIOSHA (Department of Industry and Consumer Services) requirements. The DMB contract administrator must establish a program to verify that contractors working in state facilities follow established safety requirements.

### **12.25.3 DEFINITIONS**

Contract Administrator means the State of Michigan employee who is responsible for actual contract administration and coordination.

Contractor means an individual or business that agrees to provide service or materials to the State of Michigan for a specified price.

### **12.25.4 RESPONSIBILITIES**

#### **12.25.4.1 Management**

- Provide to all visitors and contractors the necessary information relating to awareness of hazardous conditions that may be encountered.
- Retain documentation for visitors or contractors, that they have been informed of the established safety requirements.
- Ensure that when a contractor's work poses undue risk to the safety of State employees or the public, it is the contractor's responsibility to stop work and take the necessary safety precautions.

#### **12.25.4.2 Visitor or Contractor**

- Report any accident or injury to DMB.
- It is prohibited to bring any hazardous material on or in the DMB facility, without prior evaluation of a DMB safety coordinator or contract administrator.

### **12.25.5 REQUIREMENTS**

The following represent the minimum requirements when contracting outside services or arranging for visitors within state owned facilities.

1. Identification and evaluation of potential hazards arising out of the particular use of DMB facilities or property.
2. Determination of whether or not DMB equipment may be used by contractor personnel and whether they have the required knowledge to operate that equipment safely.
3. Compliance with municipal and/or state fire and life safety codes for public property (i.e., National Fire Protection Association, BOCA and other pertinent standards).
4. A system for the correction or elimination of identified hazards or exposures for potential injury or loss to the DMB, including requiring the utilization of appropriate safety equipment as well as the communication and required adherence to DMB safe practices and procedures.
5. Accidents or incidents involving visitors or contractors should be promptly reported to the DMB Safety Coordinator or facility manager as soon as possible.
6. Outside visitors or contractors should not bring hazardous materials into any DMB facility without the prior hazard evaluation and consent of the Safety Coordinator or facility manager.
7. Should the contractor be required to perform cutting or welding (hot work), such activities will require fire safety precautions.

### **12.25.6 TRAINING**

Visitors and Contractors need to be informed of the general hazards that may be encountered, and how to utilize the necessary countermeasures and precautions. It is suggested that a pre-job safety briefing be performed by the supervisor or facility manager. Simple documentation should be retained acknowledging that the contractor understands their safety requirements and that their employees will adhere to recognized safety practices.

In addition, DMB employees should be informed of these requirements to ensure that the contracting of services is centrally coordinated.

### **12.25.7 REFERENCES**

*For additional information regarding specific requirements for contractor safety requirements refer to MIOSHA, General Industry Standards, Part 92 “Hazard Communication”, Part 85 “Control of Hazardous Energy Sources”, and Part 90 “Confined Space Entry”.*



## **12.26 WELDING AND CUTTING**

### **12.26.1 PURPOSE**

The following work practice requirements are established to prevent injury to employees and to provide a basis for the safe operation, maintenance, and use of welding and cutting equipment.

### **12.26.2 SCOPE**

Only trained employees will be authorized to operate welding and cutting equipment and perform associated tasks such as brazing, or soldering. Information provided by the manufacturer should be referenced for specific applications, maintenance, and operating practices. It is the supervisor's responsibility to ensure that the information and work practices contained within this work practice requirement are effectively communicated and followed.

All welding and cutting operations performed by DMB personnel or contractors must be carried out in accordance with standards set forth by the MIOSHA Part 12 Welding and Cutting.

### **12.26.3 DEFINITIONS**

AC means alternating current.

Arc Welding means a process for joining metals by heating with an electric arc with or without a filler material.

Brazing means a process of joining metals without melting them with a filler metal melting above 800 degrees F.

Cutting means a process in which the severing or removing of metal is effected by the use of an arc or flame.

Cylinders means containers for storing compressed gases manufactured, labeled and periodically tested in accordance with DOT specifications or manufactured in accordance with the National Fire Protection Association.

DC means direct current.

Gas Welding means a process for joining metals by heating with a gas flame with or without the use of pressure and with or without the use of filler materials.

Manifold means an assembly of pipe and fittings to interconnect either single or multiple sources to single or multiple outlets.

Noncombustible means having properties that do not support combustion.

Resistance Welding means the joining of metals by the use of heat generated at the joint by the resistance to flow of electric current and by the application of pressure.

Soldering means the process of joining metals without melting them using a filler metal melting at 800 degrees F, 427 degrees Centigrade, or below.

Spot Welding means a form of resistance welding in which the current and pressure are restricted to the spot of metal surfaces directly in contact between the electrodes.

## **12.26.4 RESPONSIBILITIES**

### **12.26.4.1 Management**

- To instruct the employee in recognized welding and cutting operations, along with the required safeguards and associated hazards.
- Ensure employee proficiency (through training and testing) before allowing the employee unsupervised use of arc, gas welding and cutting equipment.
- Provide protective devices such as but not limited to the use of protective curtains, safety glasses/shields, welding helmet, sleeves, apron, leather gloves, etc., and instruct the employee in their proper use.
- Provide adequate ventilation in the immediate area where welding is to be performed.

### **12.26.4.2 Employee**

- Maintain effective operation of specific safety devices.
- Use the welding and cutting equipment as trained and authorized.
- Utilize the required PPE.
- Report any damaged or defective welding and cutting equipment to supervision.

## **12.26.5 REQUIREMENTS**

### **12.26.5.1 Designated Areas**

Welding and cutting should be performed only in designated areas. Welding or cutting outside of a designated area is not permitted within any DMB building without authorization from a supervisor.

### **12.26.5.2 Fire Precautions**

1. When welding or cutting outside a designated area, remove the work to a location free from combustible materials if possible. If the work cannot be moved, clear flammable materials and rubbish from the working area for a thirty-five-foot radius. If these precautions are not feasible, shield or cover

such materials with fire resistive materials to protect them from combustion. Holes in floors and walls must be covered to prevent sparks from falling through unnoticed onto people or combustible materials below.

2. Maintain a fire watch when doing this kind of work and have a fire extinguisher readily available. Depending on the job, more than one fire watch may be needed on the other side of a floor or wall that pipe passes through, to control potential ignition from hot sparks or conduction. Check the area for 30 minutes to 1 hour after stopping for the day to make sure no smoldering materials exist.
3. Do not weld or cut any closed vessel that has contained or is suspected to have contained flammable or toxic materials until it has been tested, thoroughly cleaned, purged, and vented. Traces of the material may still be in the vessel and result in a fire or explosion, or create toxic exposure.
4. If smoke detectors have been deactivated due to welding in the immediate area, it is imperative that they are restored and tested before leaving the area.

#### **12.26.5.3 Protective Equipment**

1. When welding or using a torch, wear lenses for filtering harmful radiation. Refer to *Section 12.26.5.8 Protection Against Ultraviolet Rays* for filter density requirements. Always protect these lenses by the use of cover plates and when welding, wear a welding helmet. Head protection must be worn when doing overhead welding or cutting.
2. Gloves and aprons of leather or other insulating materials and other appropriate protective clothing must be worn as needed. Always wear some sort of covering on the head to protect the hair from sparks. Nylon and other synthetic fibers are not recommended, because sparks coming in contact with them can cause serious burns from the melting fabric.
3. Wear high-cut shoes so that sparks will not fall inside them. Never wear trousers with cuffs unless protected by overalls. Open pockets are also very undesirable, as they too can catch sparks.

#### **12.26.5.4 Toxic Fumes and Gases**

Many welding operations produce toxic fumes and gases. If you have occasion to weld or cut materials or use fluxes containing fluorine compounds, zinc, lead, beryllium, cadmium, mercury, or other toxic materials, special ventilation and respiratory protection will be needed.

#### **12.26.5.5 General Requirements for Gas Cutting or Welding**

1. Oil and grease in the presence of oxygen may ignite with explosive violence. Do not use oil, grease, or other readily oxidizable substance on

any regulator or torch. Do not handle this equipment with oily rags or gloves.

2. Never use acetylene from cylinders without reducing the pressure through a suitable regulator attached to the cylinder valve.
3. Always keep the key or wrench of the acetylene cylinder valve on the cylinder while in use. Never open an acetylene cylinder valve more than one full turn; then, in case of fire or other emergency, the valve can be closed quickly.
4. Hoses and power cables must be placed so that they will not be trampled on, run over, or exposed to flying sparks, hot slag, or hot objects. Do not leave them in or across corridors and walkways, where they can become tripping hazards, nor suspend them overhead, or use as barriers to close off the area in use. Contact with oil and grease should also be avoided.
5. Examine all hoses frequently for worn places, leaks, and loose connections. To test for leaks in the apparatus and hoses, use a flammable gas detector or a soapsuds solution; never use a flame. An authorized repair person must immediately repair all leaks and other damage. Do not use tape for repairs.
6. Proper equipment and apparatus, torches, regulators, wrenches, and other tools must be used. Open cylinder valves slowly. A hammer or improper wrench must not be used to open cylinder valves. If valves cannot be opened by hand, cylinders should be returned to the supplier. If there is found to be a leak around the valve stem when the valve on a cylinder is opened, close the valve and return the cylinder to the supplier with a tag attached.
7. Cylinders must not be allowed to become part of an electrical circuit, and striking an arc against a cylinder is prohibited.
8. Cylinders must be transported by cart or truck and unless securely chained to a welder's cylinder cart all regulators must be removed from the cylinder during transport.
9. Cylinders should not be dropped or roughly handled.
10. Utilize the Hot Work Permit and take the precautions listed on the permit checklist when performing any cutting, welding and brazing with portable gas or arc equipment outside established welding booths and maintenance shops. *(See Appendix A Hot Work Permit.)*

#### **12.26.5.6 Gas Cylinder Storage**

1. Store oxygen and acetylene cylinders separately in specifically assigned locations where they will not be knocked over or damaged by passing or falling objects. Chain or secure cylinders to the wall or an immovable object so that they will not be knocked over accidentally. Where cylinders

are stored outside, they should be protected from accumulations of ice and snow and from the direct rays of the sun.

2. Oxygen cylinders must be kept and used in an upright position and must never be used at a pressure exceeding 15 pounds per square inch.
3. When returning empty acetylene cylinders, be sure that the valve is closed to prevent evaporation of the acetylene solvent acetone.
4. Valve protection caps must not be used for lifting cylinders or for moving them from one position to another. Electric magnets and hoisting slings should not be used when moving or transporting cylinders. Keep cylinder caps in place when transporting cylinders. Identify cylinders when empty and replace the caps. Do not use oxygen to blow out pipelines or to dust off work or clothing.

#### **12.26.5.7 Resistance/Arc Welding**

1. The secondary of the supply transformer and case of any portable welding transformer as well as the frame must be grounded.
2. An annual inspection of resistance welding machines must be conducted.
3. A foot control must be guarded to prevent accidental activation.
4. Electrode holders, when not in use, must be placed in such a manner that they cannot make electrical contact with people, other objects, fuel, or compressed gas tanks.
5. No cables may be used where splices are within 10 feet of the electrode holder. Do not coil or loop electrode cables around parts of your body. Do not stand in water or on damp ground when doing electrical welding.

#### **12.26.5.8 Protection Against Ultraviolet Rays**

The following is a guide for the selection of the proper shade number of filter lenses or plates used in welding. Shades more dense than those shown for various operations may be selected to suite the individual's needs.

Shielded metal-arc welding	
1/16, 3/32, 1/8, 5/32-inch electrodes	10
Gas-shielded arc welding (ferrous)	
1/16, 3/32, 1/8, 5/32-inch electrodes	13
Gas-shielded arc welding (non ferrous)	
1/16, 3/32, 1/8, 5/32-inch electrodes	11
Shielded metal-arc welding	
3/16, 7/32, 1/4-inch electrodes	12
5/16, 3/8-inch electrodes	14
Atomic hydrogen welding	10-14
Carbon arc welding	14
Soldering	2

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Torch brazing	3 or 4
Lighting cutting, 1-inch	3 or 4
Medium cutting, 1-inch to 6-inches	4 or 5
Heavy cutting, 6-inches or more	5 or 6
Gas welding (light) up to 1/8 inch	4 or 5
Gas welding (medium) 1/8 inch to 1/2 inch	5 or 6
Gas welding (heavy) 1/3 inch and over	6 or 8

### Note:

In gas welding or oxygen cutting where the torch produces a high yellow light, it is desirable to use a filter lens that absorbs the yellow or sodium line in the visible light of the operation (spectrum). Some shades use optical density number and these are not the same as above.

\*The choice of a filter shade may be made on the basis of visual acuity and may therefore vary widely from one individual to another, particularly under different current densities, materials, and welding process. However, the degree of protection from radiant energy afforded by the filter plate or lens when chosen to allow visual acuity will still remain in excess of the needs of eye filter protection. Filter plate shades as low as shade 8 have proven suitable radiation-absorbent for protection from the arc welding processes.

### 12.26.6 TRAINING

Employees need to be instructed in the care, use, of welding and cutting operations, as well as the hazards associated and the safeguards or precautionary measures, before being assigned a specific job task. Training should consist of the information contained within this work practice requirement in addition to equipment manufacturer's guidelines. Instruction can be on-the-job or classroom or a combination of both. The supervisor must retain documentation of training or certification.

## **12.26.7 REFERENCES & APPENDICES**

*For additional information refer to the General Guidelines A6.1-1966 of the American Welding Society American National Standards Institute (ANSI) Z49.1-1973.*

*For additional information refer to the General Industry Part 12 “Welding and Cutting”, MIOSHA Health R3240, MIOSHA Construction Part 7 “Welding and Cutting”.*

Appendices:

A. Hot Work Permit

**DMB Safety and Health  
Policies and Procedures**

**12.26.7.1 APPENDIX A – HOT WORK PERMIT  
FOR CUTTING, WELDING, AND BRAZING  
WITH PORTABLE GAS OR ARC EQUIPMENT**

(For work outside established welding booths and maintenance shops)

Date \_\_\_\_\_ Building/Facility \_\_\_\_\_

Department \_\_\_\_\_ Location \_\_\_\_\_

Work to be done \_\_\_\_\_

Special Precautions \_\_\_\_\_

Is Fire Watch required due to combustible materials within 35 feet or next to adjacent walls/floors/ceilings? \_\_\_\_

If "YES" see FIRE WATCH checklist below:

I certify that the location where this work is to be done has been examined, necessary precautions taken, and permission granted by my supervisor for this work. If necessary, the Confined Space Entry Permit has also been completed. Post this permit at the job site.

Permit expires \_\_\_\_/\_\_\_\_/\_\_\_\_ Signed \_\_\_\_\_

Individual responsible for authorized welding, cutting, and brazing

Time Started \_\_\_\_\_ Completed \_\_\_\_/\_\_\_\_/\_\_\_\_

**ATTENTION!**

Before approving any cutting, welding or brazing permit the supervisor or Safety Coordinator shall inspect the work area and confirm that precautions have been taken to prevent fire. Check all appropriate blocks.

**PRECAUTIONS**

- ☐ Sprinklers (installed) are in service.
- ☐ Cutting, welding, or brazing equipment in good condition.
- ☐ Nearby employees advised of the work.
- ☐ Shields erected to prevent eye injury due to arc.
- ☐ All necessary protective clothing and equipment available, including adequate ventilation.
- ☐ Persons performing work fully trained.
- ☐ No combustible materials or flammable liquids within 10 feet of the work.

**WITHIN 35 FEET OF WORK**

- ☐ Floors swept clean of combustibles.
- ☐ Combustible floors wet down, covered with damp sand, or other shields.
- ☐ Combustible materials and flammable liquids protected with covers, guards, or metal shields.
- ☐ All wall and floor openings covered.
- ☐ Covers suspended beneath work to collect sparks.
- ☐ Explosimeter used to check LEL near flammable liquids. (If no explosimeter, move flammables)

**WORK ON ENCLOSED EQUIPMENT AND IN CONFINED SPACES**

**(Tanks, containers, ducts, dust collectors, etc.)**

- ☐ Equipment cleaned of all combustibles.
- ☐ Containers purged of flammable vapors and LEL checked.
- ☐ Confined space entry permit completed

**FIRE WATCH, IF REQUIRED**

- ☐ To be provided during and 30 minutes after operation, if within 35 feet of combustibles.
- ☐ Supplied with extinguishers and small hose (when installed).
- ☐ Trained in using fire extinguisher/hose and in sounding fire alarm.

**FINAL CHECK**

- ☐ Check for fire in area, adjacent rooms, and floors 45 minutes after completion of hot work, regardless of the location.
- ☐ Enable smoke detectors

Signed \_\_\_\_\_  
Supervisor



## **12.27 WOODWORKING MACHINERY**

### **12.27.1 PURPOSE**

The requirements stated within this work practice are established to prevent injury to employees who are required to work with various forms of woodworking machinery and associated equipment.

### **12.27.2 SCOPE**

These work practices apply to any DMB employee with a job that consists of working with or around woodworking machinery. It is the supervisor's responsibility to ensure that the information and work practices contained herein are effectively communicated and followed.

### **12.27.3 DEFINITIONS**

Anti Kickback Finger means the device, which extends at the trailing edge of the blade guard, which oppose the tendency of the saw to pick up and throw the material back at the operator.

Band Saw means a machine equipped with a lower and upper wheel on which a continuous blade rides and past which the material is pushed.

Block means a short block of wood, provided with a handle similar to that of a plane and a shoulder at the rear end and used for pushing stock over revolving cutters.

Circular Saw means a machine with a circular blade used for ripping, cross-cutting, making dadoes and rabbeting and having a table to support the material.

Combination or Universal Machine means a machine combining several operations, including but not limited to sawing, jointing and drilling.

Interlocked Barrier means a guard attached to a machine and interlocked so that if the guard is not in place the machine will not start or, if running, the power will be cut off.

Planar means a machine with a revolving cutter head set above an adjustable table on which the material is passed under the cutter head by powered rollers.

Point Of Operation means the area of a machine where material is actually worked.

Push Stick means a narrow strip of wood or other soft material with a notch or sharp point at one end to push material through the point of operation.

Radial Saw means a machine with a circular blade suspended from a horizontal arm, which is pulled through the material.

Router means a machine with a revolving vertical cutter and a motor suspended over a table and used to cut a predetermined design.

Run means the distance from the pulley to pulley.

Walkway means a path of travel for foot traffic only.

## **12.27.4 RESPONSIBILITIES**

### **12.27.4.1 Management**

- Instruct the employee in the safe operation of woodworking machinery, along with the safeguards and associated hazards.
- Train employees on how to inspect, use, and maintain equipment.
- Ensure woodworking machinery is operated with appropriate guards and guarding devices.
- Enforce the use of personal protective equipment.
- Assure the proper lockout procedure is implemented during any service, repair or general maintenance activities.
- Maintain equipment in a condition that will not create a hazard for employees.

### **12.27.4.2 Employee**

- Understand the requirements relating to the safe care, use, and protection of woodworking machinery and associated equipment.
- Inspect woodworking machinery for defects or missing guards before operating, report any hazardous conditions to supervisor.
- Wear necessary personal protective equipment when operating machinery, or when conditions exist that require the use of PPE.

## **12.27.5 REQUIREMENTS**

1. Machinery must be properly anchored or secured to prevent unintentional movement.
2. Machinery must be positioned so that the operator is not required to stand in an aisle unless protection is provided.
3. The vibration of the machine must not create a hazard to the operator.
4. Operating controls must be located within reach of the operator while he/she is at their regular workstation.

5. A woodworking machine must not be allowed to unintentionally restart upon restoration of power after a power failure.
6. Woodworking machinery must be designed to accept a lockout device. Woodworking equipment can be extremely dangerous if not used properly. Read equipment instruction manuals and follow manufacturer guidelines regarding use and personal protection equipment guidelines.

#### **12.27.5.1    *Operating Rules***

1. Safety devices must not be bypassed or modified in any manner.
2. Cutting blades, knives and other apparatus must be maintained in proper adjustment and tension.
3. Shavings and dust should be removed to prevent hazardous accumulation.
4. Only blades meeting the manufacturers' specification should be used.
5. Feeding tools should be used to maintain distance between fingers and the point of operation.
6. Arbors of circular saws must be free of play.
7. All equipment should be periodically inspected and maintained (i.e., lubrication, tension adjustment, blade guards, etc.) as required by the manufacturer.

#### **12.27.5.2    *Equipment Specific Guidelines***

##### **12.27.5.2.1    *Table Saws***

1. Feed table saws with your body to the side of the stock.
2. Adjust the blade height to the lowest setting to perform the cut.
3. Adjust and use the splitter and anti-kickback fingers when ripping.
4. Be sure to hold the stock firmly against the rip fence.
5. Remove the rip fence during crosscuts.
6. Keep all guards in place.

##### **12.27.5.2.2    *Circular Saws***

1. Keep all guards in place.
2. Be prepared in case the saw binds up in the stock.
3. Be sure blade is sharp and free of pitch to minimize chances of binding.
4. Be sure to use the correct blade type for the material being cut.
5. Be sure the blade is tight on the arbor.
6. Provide firm support for the material being cut.
7. Begin cut with motor and blade at full speed.
8. A cracked or otherwise defective saw blade must not be used.

#### **12.27.5.2.3 Radial Arm Saw**

1. When rip-sawing, be sure to feed the stock from the appropriate direction and use anti-kickback fingers.
2. Keep all guards in place.
3. When crossing-cutting, pull the saw towards you.
4. Keep material tight against fence.
5. Return saw to the rear of the track.
6. An adjustable stop must be provided to prevent the forward travel of the blade at the end of the arm.

#### **12.27.5.2.4 Band Saw**

1. Feed with body to the side of the stock.
2. Adjust the height of the blade guard to no more than 1/4-inch clearance from the stock. All portions of the blade must be enclosed by the guard except the working portion of the blade between the bottom of the guide and the table.
3. Make sure the blade is the appropriate type for the material being cut and has the correct tension.
4. Stop machine to remove scrap or pull out an incomplete cut.
5. Cut only flat stock.
6. Use push sticks for small parts.

#### **12.27.5.3 Personal Protective Equipment**

1. Follow manufacturer's guidelines regarding the use of personal protective equipment (eyewear, face shields etc.)
2. Make sure that all clothing fits snugly prior to using any woodworking equipment.

### **12.27.6 TRAINING**

Employees need to be instructed in the care, use, operation and hazards associated with woodworking machinery and related equipment before being assigned a job task by the employer. Training should consist of information contained within this work practice requirement and other information related to the type of equipment and its use within a specific work assignment. Instruction can be on-the-job or classroom or a combination of both. The supervisor must retain training documentation.

### **12.27.7 REFERENCES**

*For additional information regarding jointers, tenoning machines, boring machines, shapers, lathes, various sanding machinery and other woodworking machinery refer to MIOSHA, General Industry Safety Standard Part 27 "Woodworking Machinery".*